

AVIATION WEEK

A MCGRAW-HILL PUBLICATION

OCT. 13, 1952

50 CENTS

Sure footing for the "Cutlass"



(Photo courtesy U.S. Navy)

First-line U.S. Navy shipboard jet, the Chance Vought "CUTLASS" relies on Goodyear landing equipment for safe, sure stops.

Designed to out-fly and out-fight any shipboard jet, the new Chance Vought F7U "Cutlass"—like many of the outstanding aircraft now in production—relies on Goodyear for its main landing equipment.

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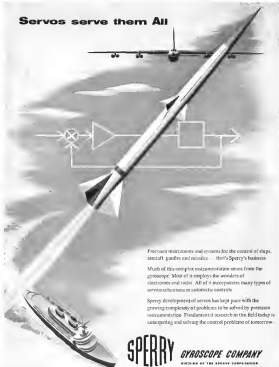
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Domestic

Mexico has accepted United States' invitation to accept talks on a bilateral air agreement. Discussions aimed at reaching an agreement have been held all and on between the two countries since 1946 without success. Most recent meeting was last December. The new action undoubtedly resulted from the recent burst of proposed changes in the Mexican aerial act, including Mexico's recent ratification of Eastern Air Lines to fly into Mexico from New Orleans and of when Mexico airlines were given equal rights in the country.

An income to 70-60% in 1957, compared to the present rate of approximately 35% is forecast by Air Transport Association, ATA's president Vice John Henry S. Lord and U.S. Airline industry should carry more than 4% within passenger over domestic and international routes in 1960, an increase of 84% over 1955. Jet aircraft in U.S. aircraft operation is predicted for 1957-58.

Seaboard & Western Airlines has announced Texas-Pacific MATS flights via Wake Island. Carrier was forced to re-route its aircraft following last month's typhoon which disrupted all airline movements through the area.

Prize Tiger Line began service on its big Navy Air freight contract Oct. 1. Tiger was contract from Slick Airways in landing competition.

First over-the-top flight by Canadian via Airline Service, via USAF base at Thule, Greenland (Aviation Week Oct. 6, p. 14), will leave Los Angeles about Nov. 10, stopping at Edmonton, Alta., Canada, and Thule, Greenland, where USAF has just completed a new base. SAS hopes to start regular daily service over route next April.

Four Civil Aeronautics Administration and State Department officials are touring the Pacific to check up on U.S. responsibilities in civil aviation administration. They are visiting Hanoi, Manila, Hong Kong, Bangkok, Tokyo and Alaska.

For Australia, World Airways has signed a new letter contract in Coastville enabling PAA to manage service there. Pan-Am flights to and from Guatemala were suspended July 21 when airline workers in Guatemala City struck. Employees will get two months

lock pay to offset loss of income during strike.

Col. Argente Post, believed to be the thirteenth man to fly in airplane on the U.S. flag in New York Oct. 4 at the age of 78. It was Post who suggested that Kenneth Clegg put up a \$15,000 prize for a successful New York Penn flight, and he wrote the rules for the contest. He was a founder of the Aero Club of America, and for 20 years its secretary. He was a noted balloonist in the early years of the century, in 1909 establishing with Clifford B. Benson a duration record for two balloons of 48 hr, 16 min.

Civil Aeronautics Board overrules two rulings from the Apr. 29 PAA Subcommittee made in its decision people report and riders was free on from mass shortage. "Indicating that they had broken from aircraft the air prior to ground impact," Pothomov, the unknown No. 2 report and prep apparently must be even further away.

Financial

Elmer Stop-Nat Corp., Orem, N. J.,



TDH, BOMB report going into line loss of this Company's Western Air Service DC-1 while in flight. It was shot down about plane in action. The pilot badly injured 15 men in blood from Mexico City, was seen a military field and was killed the crippled ship with 17 passengers aboard.

NEWS DIGEST

has declared 25-cent per share dividend on its common stock, payment Nov. 1 to holders of record Oct. 15.

Jack & Heron, Inc., Cleveland, declared dividends on company's common and preferred stock last month. A 15-cent dividend will be paid on common stock Nov. 1 to holders of record Oct. 15. A 30-cent quarterly dividend was declared on cumulative preferred stock, 4¢ a share (\$10 per share).

Solar Aircraft Co., San Diego, will pay a 22-cent per share dividend on its preferred stock Nov. 15 to holders of record Oct. 15.

International

Four English Electric Canberra jet bombers and two Handley Page Hastings transports are scheduled to make an extensive tour of Latin America by leaving last fall from Mexico for "goodwill and courtesy and training."

Some 60 RCAP Sabre fighters are to fly the Atlantic to the RCAP's new fighter base near Malta, France. The three squadrons will represent the first Continental-based operational air units the Canadian are contributing to NATO defense.

Peru de Brazil plans to add another route, from South America to meet to Hamilton, Guyana, and may also extend service to the west coast as Chile according to Dr. Paulo Sampaio, president of the carrier.

Addition of water injection devices to provide another engine operation will delay appearance of Comet planes on Domestic Australia route until mid-November, Canadian has announced. CPA expects to start weekly Coast service over route there, like stopping schedule to twice a week.

BRAC will inaugurate Comet service London Singapore Oct. 14, with seven stops enroute on the 7,760-mile trip—Rome, Cairo, Bahrain, Karachi, Calcutta, Rangoon and Bangkok.

British Overseas Airways is still studying its flight schedule of the Comet, but reportedly cannot see it in near future because of continued cost of refueling stations, equipment and operations is prohibitive unless a big airline firm is using the service along a particular route.



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AVIATION CALENDAR

- Oct. 14-15-Fifth annual Airport Development and Operation Conference, Hotel Chalmers, Syracuse, N. Y.
- Oct. 15-24-American Welding Society to travel full meeting, Bellevue Stratford Hotel, Philadelphia.
- Oct. 22-Air Transport Section, National Safety Council, annual meeting, Conrad Ulster Hotel, Chicago.
- Oct. 25-Nov. 2-International aviation and travel exposition, Navy Pier, Chicago.
- Oct. 26-27-American International Airport Air Fair and Open House, Los Angeles.
- Oct. 28-30-Thompson Aircraft Electronics System Conference, sponsored by Vidco Inc., Hotel Park Sheraton, Detroit.
- Oct. 28-30-AIEE Air Transport Committee annual meeting, Commodore Perry Hotel, Toledo.
- Oct. 29-31-AIEE conference on machine tools, Sea Bock Hotel, Albany, N. Y.
- Nov. 6-7-National Radio and Instruments meeting, Society of Automotive Engineers, The Mayo, Tulsa, Okla.
- Nov. 7-IRE symposium on measures to reduce Western Union Audiotape, New York.
- Nov. 8-Annual Migration Tool Engineering conference, University of Illinois, Urbana, Ill.
- Nov. 11-12-Power distribution annual meeting, Link House, Pa.
- Nov. 13-15-Aeronautical Society of America symposium on aircraft noise, Sea Diers, Cold. (For details, write ASA, 17 E. 51 St., New York 22.)
- Nov. 17-18-National Aviation Trades Association convention, Hollywood Roosevelt Hotel, Los Angeles.
- Dec. 1-Symposium on light metal heavy bearings and extensions for aircraft, SAE, ASME, IAS and AIAA.
- Dec. 2-8-Aviation Distributors and Manufacturers Association annual meeting, The Rensselaer, Miami Beach.
- Dec. 5-Society for Experimental Bern Analysis, annual meeting, Hotel McVieps, New York.
- Dec. 10-11-Joint NEE-SRE-ACM conference on electronic navigators, Park Sheraton Hotel, New York.
- Dec. 12-Weight loss lecture to be presented by the IAS at 3 p.m., U. S. Chamber of Commerce auditorium, Washington, D. C.

PICTURE CREDITS

5-McGraw-Hill World News; 6-11-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100-101-102-103-104-105-106-107-108-109-110-111-112-113-114-115-116-117-118-119-120-121-122-123-124-125-126-127-128-129-130-131-132-133-134-135-136-137-138-139-140-141-142-143-144-145-146-147-148-149-150-151-152-153-154-155-156-157-158-159-160-161-162-163-164-165-166-167-168-169-170-171-172-173-174-175-176-177-178-179-180-181-182-183-184-185-186-187-188-189-190-191-192-193-194-195-196-197-198-199-200-201-202-203-204-205-206-207-208-209-210-211-212-213-214-215-216-217-218-219-220-221-222-223-224-225-226-227-228-229-230-231-232-233-234-235-236-237-238-239-240-241-242-243-244-245-246-247-248-249-250-251-252-253-254-255-256-257-258-259-260-261-262-263-264-265-266-267-268-269-270-271-272-273-274-275-276-277-278-279-280-281-282-283-284-285-286-287-288-289-290-291-292-293-294-295-296-297-298-299-300-301-302-303-304-305-306-307-308-309-310-311-312-313-314-315-316-317-318-319-320-321-322-323-324-325-326-327-328-329-330-331-332-333-334-335-336-337-338-339-340-341-342-343-344-345-346-347-348-349-350-351-352-353-354-355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226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WHO'S WHERE

In the Front Office

Ray E. Wells has been appointed a vice president of Coast Central Aircraft Co., Glendale, Calif. Wells had been company controller.

Robert A. McMillan has been named general manager of Los Angeles Dept. of Airports, succeeding **Adia John W. Riven**, Jr., who resigned. John McMillan will have charge of International and San Fernando Valley Airports.

Frank Russell, Jr., has been named president of Gophers Electric Mfg. Co., Chicago, succeeding his father, the late F. F. Russell, Sr. The new president was one of the firm's co-founders in 1911.

Changes

Carl E. Bowman has been appointed senior scientist for Engineering Research Associates, Inc., St. Paul, Minn., where he will supervise special projects for the electronic firm.

George J. Fowler has been designated general sales manager for Aerquip Corp., Jackson, Mich., and **Marshall J. Reddy** has been appointed works manager.

Orin Hansen has been appointed parts sales manager of Allacraft Mfg. Co., Los Angeles.

Robert E. Moore has been named section manager for the application engineering department of Jack & Elbert, Inc., Cleveland.

Jim Laska is now group engineer for cockpit design in Flightmaster Flight Simulation Division of Engineering and Research Corp., Riverside, N.J. **Barrie E. May** has been promoted to group engineer for structure at the same division.

Ray M. Brown, Jr., has joined Douglas Helicopters Inc., Elmhurst, Ill., as project engineer in charge of CNA certification. **John J. Kerner** has joined Douglas as production manager.

A. J. Reddy has been named assistant to McDonald Aircraft Corp.'s Dayton, Ohio, representative.

A. L. Chubb has been promoted to director of maintenance and engineering for the entire Falcen Air Lines' system.

Samuel J. Hruska, Jr., has been appointed manager and project engineer for the Industrial Steel Control Unit, Hartford, Conn.

Harry Harts has joined Goodrich Aircraft Corp. in executive capacity of the tool engineering division and **Paul R. Sheldahl** has been named manager of the tool engineering staff department.

J. W. Woodward has joined R. M. Holmberg Corp., N.J., as West Coast representative, replacing **J. W. Reed, Jr.**, who has been reassigned to the New York, N.Y., headquarters and promoted to assistant sales manager of the Government Sales Division.

Resignations

Bob G. Sander has retired from Bellanca Aircraft Corp.'s engineering department after 15 years with the firm in Garden, Ind., first as designer pilot and engineer.

INDUSTRY OBSERVER

Despite official Air Force statements that increasing complexity of military aircraft is not an acute problem, at least to overall manufacturers in the United States, Britain and France are adopting and building stepped-down lightweight interceptors aimed at shortening all aircraft's complexity in overall weight. North American Aviation and Douglas have projects in the wall for the USAF and the Navy respectively. In England, Fynce, de Havilland and Folland are carrying the ball, in France, Dornier is working on a delta design to meet this requirement.

Both Vickers-Armstrongs and Hawker are planning advanced development of the Swift and Hunter interceptors; the Swift eventually will go to a semi-cantilever wing, while the Hunter will continue with wing sweepback up to 30 deg.

Hughes Aircraft's Falcon is currently specified by USAF in its standard aircraft graded mainly for the next generation of all-weather fighters and supersonic interceptors. The Falcon will have a maximum speed of Mach 3 using a solid fuel rocket for propulsion. Guidance will be internal using a target housing device. Falcon will be carried externally on the interceptors.

Technical observers were interested to note de Havilland's swift abandonment of leading-edge wing slots in the Comet as a method of improving low speed flight characteristics of the swept wing. After failed flight testing on the Comet prototype, de Havilland switched to simple wing fences on all its production model Comets. This is the same solution to the same problem used by the Russians on the MIG-17 designs. The P-50 still uses leading-edge slots.

U.S. safety observers in Europe are disturbed by reported jolts of some flapless or in force in using civilian industries in interception targets for jet fighters when no military target planes are available. Several fatal airline crashes have occurred in the U.S. from civilian fighters bearing civilian transports.

Navy deliberation of plans to make the Grumman S2F-1 twin-engine anti-submarine plane at the new dual purpose General Motors aircraft subplant at Arlington, Tex., means more room there for venerable Becks, C-130 Hercules and Fairchild. Aircraft trading will be in full swing for quick start of an unguessed assembly, if desired, Navy sources say. Meanwhile the production line of the S2F hangs in the balance. Chances are it will never be built at Arlington.

Wing of McDonnell F-101, experimental fighter developed from experience with NF 30 fighters, is reported to be one of thinnest yet designed. Root thickness-to-chord ratio is 6% with reduction to a 4 or 4.6% ratio at tip.

Foreign aircraft designers face a tough problem in the transition from 20 years to 18 years aircraft careers. One company reports nearly 1,000 lb additional weight changeable to two of the biggest careers in a single engine jet fighter. Other groups show increases over the extremely long career of the three types—A-1, Hurricane and Spitfire—now in existence. French concern report a short-burst design which should help the problem, but goes it will in design stage, has not been built as firm.

The Gloster Meteor shows up in another of its many long tested forms with French SNECMA Atar 21C turbojets installed. Work on the project was done by Air Service Training, Ltd., one of the Hawker Siddeley Group along with Gloster.

Jet-powered turbo version of the Boeing B-47 reportedly is scheduled to fly next February. Use of jet turbines will simplify fuel storage problems of supply bases, which will need to stock only JP-4 instead of both jet fuel and high octane gas used by present piston-powered versions. Jet turbines also will permit the jet plane to be more refueled to increase altitude and speed, which it cannot do with a piston-powered refueler.

One Month to Go

Top defense officials are putting their houses in order and awaiting the arrival of new leaders.

The Truman Administration's reign doesn't end until Jan. 20, but opportunities at the President-elect for the top defense posts—Secretary of Defense, director of the Office of Defense Mobilization, chairman of the Munitions Board, and, possibly, the three service secretaries—are expected to arrive their parts shortly after the New Year elections.

• **Secretary of Defense Robert Lovett** was first to propose this course. Work on the 1954 fiscal year military budget, expected to approximate this year's \$46 billion, is an immediate and due for submission to Lovett Oct. 23. The service will have a brief three-day stay in which to submit interim plans to the Secretary. The Department's proposed budget is due for receipt at the White House Nov. 1.

The logical course from that point, as Lovett has pointed out, would be for Defense to review the 1954 budget under discussion from the President-elect and in collaboration with the next Administration's secretaries who will have to explain and defend it before congressional committees early next year.

• **Mobilization Director Henry Fowler** has followed Lovett's suit and said that his actions, too, be aimed right after the November elections for an interim period before Fowler quits Dec. 31.

Continuation of the OGDMDANTA mobilization organization is doubtful, though.

The likelihood seems to be that Ralph Tamm, current government official and deputy director of Defense Production Administration, will take over the post when Fowler leaves, for a stop-gap period while the future of the agency is determined.

• **Nonprofit Board Chairman John Small**, who after a long fight, recently has made "peace" over military production, is likely to leave soon.

The board is currently reviewing all service supply regulations—the first step toward implementation of its control over all aspects of military procurement and production.

Defense Money and Politics

Watch for Truman to put Eisenhower on the spot regarding cuts in defense appropriations on the eve of the election.

According to word reaching the Pentagon, the President will make a public announcement on Defense Department's request for its 1955 fiscal year budget. It will have the backing of Secretary Lovett, a Republican, as well as the top military command.

Regardless of Eisenhower's response, there will be an Administration catch-up.

• If Eisenhower challenges the budget as being too high, Truman can repeat his charge that the Republican candidate, seeking an "irresponsible politics," wants to "sneak out" security, in fact, wreck it—over the advice of top military advisers.

• If Eisenhower emphatically supports the budget, he would, of course, have to mollify his supporters of his cuts through reductions in defense spending.

In other years, the budget has been a well-kept secret said submission to Congress in January.

Defense Dept. Reorganization

Regardless of the election outcome, a major restructuring of Defense Department seems certain.

Candidate Dwight Eisenhower has called for it. Secretary Lovett is making a study and will lay his recommendations before the new Congress in January.

These seems to be general opinion that reorganization ought to move in two directions: (1) greater civilian control and (2) more unification, further centralizing the authority of the three services.

Some proposals being considered strengthen the top policy-making Security Council, remove the Joint Chiefs of Staff from service command and make the group purely advisory to the Secretary of Defense, increase the control of the civilian service secretaries by requiring that all orders to contractors be submitted through them, rather than through the Chiefs of Staff.

Materials Outlook

Although most business men feel that the Controlled Materials Plan will be ended early next year, Defense Mobilization Fowler says it will be needed up to June 30. Fowler's report on the materials situation:

• **Steel.** The steel industry has requested supplies from the secret supply. By Nov. 30, needs will completely disappear if all military orders due the April through September period. Delivery of all military steel allocations for 1955 by the end of the year is "virtually assured."

• **Copper.** Although still in tight supply, reports have made the copper market "considerably brighter than at any time since 1945."

• **Aluminum.** Production will shortly be expected to participate in another expansion of capacity by 200,000 tons a year due to an increase in estimated military requirements. This would bring output from 718,800 tons in 1950 to 1.7 million tons.

• **Engine alloys.** A "consolidated attack" program by several government agencies is being developed to build up a stockpile of iron-alloys for jet engine manufacturing.

World Air Traffic

In the scheduled fall, U.S.'s share of non-Communist world air traffic is now over 50%, except in cargo operations according to Air Transport Association estimates of world air traffic for 1953.

• **Passenger capacity.** 93% of the estimated 45 million passengers that will be carried on the non-Communist airlines of the world during 1953, 24,794,100 will be on U.S. carrier-built, built and intercontinental.

• **Passenger miles.** 94% of the estimated total of 27.9 billion passenger miles that will be flown, 15.1 billion will be by U.S. carriers.

• **Cargo tonnage.** 33% of the estimated total 6344 million cargo ton miles, 213.5 million by U.S. lines.

• **Mail tonnage.** 50% of the total 104.9 million ton miles, 54.5 million will be by U.S. lines.

• **Revenue tonnage.** 51% of the total 3.4 billion revenue ton miles, 1.5 billion will be by U.S. lines.

• **Number of aircraft.** 54% of the total of 2,390 aircraft is scheduled operations in the non-Communist world, 1,357 are operated by U.S. carriers.

—Katherine Johnson

Off-Shore Buying Team Near Decision

• Pentagon awaits report of industry-AF group.

• Nod is seen for Swift, Mystere 4, Fiat G.80

By Robert B. Hess

Paris—Final evaluation of European aircraft for the 1953 million fiscal 1953 off-shore procurement program, a new being made up Europe by a joint military-civilian team of USAF officers and U.S. aircraft industry specialists.

Civilian members of the evaluation team include jet engine specialists from General Electric Corp., airplane experts from Glenn L. Martin Co. and electronic technicians from Hughes Aircraft Co.

U.S. EVALUATION TEAM already has completed its study of British aircraft. Now it is scheduled to finish its European survey and submit its report to the Pentagon and to the Press office of the U.S. special representative in Europe by the end of November. No aircraft contracts will be negotiated under the program until the evaluation team report has been submitted and approved.

Washington Post L. Anderson, a former USAF general who is now deputy U.S. special representative in Europe, told Aviation Week the broad outlines of the fiscal 1953 program had been approved by NATO and the United States. However, the details on quantities of types of specific aircraft would be subject to change depending on technical developments and production bottlenecks, he said.

• **Two Objectives.** The fiscal 1953 program, which has assumed expenditure of U.S. aircraft manufacturing is based on two objectives:

• **Making up** as soon as possible an acute deficiency in the NATO air fleet for the year. Present plans call for all Swift aircraft to be purchased from Rolls, which will soon have five major factories in production on the Avon in England.

• **Building up** the European aircraft industry to the point where it eventually can sustain the military requirements of the European NATO countries without continued large scale technical



U.S. EVALUATION TEAM is headed up by Ambassador Fred L. Anderson (left, former USAF general, and Brig. Gen. Philip Smith (right) former ANAC procurement chief.



and financial aid from the United States.

As originally planned the fiscal 1953 program called for the purchase of 1,700 fighter aircraft with a \$480 million fiscal 1953 program on it, and 1,700 fighters.

Prospect—How it have the present aircraft program look now in each of the countries under consideration:

• **England.** The Vulcan Swift intercepter is the only one not on the fiscal 1953 program as it is already in production.

• **France.** The Mystere 4, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Italy.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Spain.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Sweden.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Switzerland.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Belgium.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Denmark.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

• **Netherlands.** The Fiat G.80, a new fighter, will be the only one not on the fiscal 1953 program as it is already in production.

not enthusiastic about the program. It probably will not be included in the fiscal 1953 program.

• **Italy.** Original plans called for Fiat to build the de Havilland Venom night fighter and the Ghost Mark 5 composite jet to power it. However, U.S. experts find the Venom in its present form is not the best jet for NATO night fighter requirements. The Ghost Mark 5 is not going to be a guarantee of sufficient power to operate under adverse conditions. A Ghost Mark 5 with a double generator is under development but it has not yet passed its type test. It appears unlikely it will be available for production until next summer.

In view of the rapid obsolescence cycle of the Venom and the delays on the Ghost Mark 5, experts consider it is being given indication of an advanced version of the Fiat G.80 design to meet the night fighter requirement. Although negatively designed as a two-seater jet trainer to comply with treaty limitations on the Italian aircraft industry, the G.80 can be readily converted to an improved performance night fighter.

It would require an American risk does not require an American type of engine unit, both of which would have to be built in Italy under license. U.S. experts feel there is a good possibility of establishing the basis for a military electronics industry in Italy to start in next European year.

• **France.** Avions Marcel Dassault was awarded the French portion of the fiscal

price" to any new need. The proposal jet transport would approach each other at an average speed of over 1,000 mph.

- **Sealed electrical system.** The airlines want to eliminate all electrical "leaky legs." Use of connector plugs and receptacles "to facilitate routine maintenance should be prohibited." They argue that use of terminals used and built in temperature-sensing devices for motor control benefits.

- **Navigation.**—The airlines specify that they want precision for airborne radar, practical navigation computer, and visual traffic display indicator. All of these airborne aids are in development now.

- **Keeneye Fuel.**—The airlines ask manufacturers to complete payload and range on the basis of present conventional engine fuel requirements. But they recognize the new engine a severe penalty in the high fuel consumption of the jet. They ask manufacturers to study operating characteristics of the proposed place at all altitudes in an effort to find dispatch characteristics that "be further enhanced by combining fuel engine requirements." However, electronic traffic control to speed traffic processing appears the greatest hope here.

- **Pressurization.**—First demand of the airlines is for self-contained air conditioning capable of keeping crew and passengers in comfort on the ground as well as in all conditions of flight. Electronic pressurization equipment are available, as given detail. Whether there is a specification that the passengers and crew shall be in perfect comfort all the time.

Explosion development should be fully studied against:

- **Div Bakes.**—The plane should be able to descend from 30,000 to 38,000 ft at an average rate of 7,000 ft per min. as a reserve. In the glide path the plane should be able to glide at a 100-1 mph with engine set in high enough gear to avoid idling power within two seconds if needed.

- **Leading Gas.**—The ATA specification is to maintain 100 ft in total air as more than two inches on any side. "Harden which should be avoided if at all possible."

Hong Kong Plans

(McGraw-Hill World News)

Hong Kong—Plans are underway to modernize Kai Tak Airport to take care of BOAC's proposed largest and fastest transport services through the For First A London firm of civil engineers has been hired to do surveys. They face a difficult task, since the field has mountains on one side and nowhere on another.

Western Granted Route Extension

Civil Aeronautics Board has granted Western Air Lines a route extension from Salt Lake City to Rapid City to allow the company a direct flight from Los Angeles across a gateway that was sold by the same airline five years ago. CAB's 4-6-1 decision ended a stir in the industry because the Board previously has favored interchange over route extension to bring airports through service to new areas. However, Defense Department support of Western's route proposal apparently influenced the decision.

CAB in the decision rejected United Air Lines application for a Denver-Missoula extension, the United Board Airlines interchange proposal and the United-Western interchange urged by the CAB examiner in this case.

The Board also says a proposed Trans World Airlines level interchange is not good enough because it is 150 mi longer than the new Western routing. However, TWA says this interchange application, still pending CAB decision, may render better through service than the new Western route. CAB emphasized that Western should provide local stops on the new service, as TWA says it can stop interchange would actually be better. It would also offer four engine planes in competition with Western's proposed Constellation service.

CAB Chairman Donald Nympp wrote a strong dissent. He studies the company's recommendation. United-Western interchange and says traffic on the new route will be heavier than former. Other major objections by Nympp proposed that United's service is inferior to Constellation DC-6B interchange proposal, "disturbs the historical pre-emption of other carriers in this market" — proposed regional service will end, Frontier Airlines a back issue.

The Board privately estimates:

- **Western-United cooperative interchange** as "adequately" opposed by the carrier because of their intense competition as the West Coast market.

- **Adequate through-service** from South Dakota, Wyoming and Utah to the Coast "can only be met by granting Western's application."

- **Defense Department** urged certification to connect the Strategic Air Command base at Rapid City with the AP supply depot near Salt Lake City, upon which it is dependent for logistic support. Says the CAB inquiry on this point "has even somewhat greater weight to the testimony of the Department of Defense than did the ex-aminers."

- **Schedule needs** are not an issue with

Western, the CAB contends, since the company's main aim is a "compensation" one now.

- **Business diversion** from other airlines will not affect the benefit gained in the improved service.
- **Western's route** integrates needs improvement.

Ham Standard Checks Hollow Prop Cracks

Two recent accidents involving Hamilton Standard hollow steel propellers have caused the manufacturer to review inspection and maintenance practices of the airlines to make sure that they are adequate and conform to those Hamilton's recommendations and service bulletins.

Both accidents occurred with the Model 24260 145-hp Hamilton's evening propellers installed on Boeing Stratocruisers.

In the first, prop had to be installed on a Pan American World Airways' ferry flight after a crack in one blade contacted almost all the way across the blade and about 14 in. on the other side.

In the second, a crack was found under the door boot extending about 3 in. on either side of the blade's leading edge on a Northwest Airlines' 137. How Standard believes the cracks probably resulted from damage in service.

Mobilizer Seeking Campbell Successor

Defense Mobilizer Henry H. Fowler last week was weighing the problem of picking a successor to William L. Campbell, chief of Defense Production Administration's Office of Production and head of DPA's Aircraft Production Board, who resigns effective Nov. 1.

Campbell had planned to leave Oct. 1 but was persuaded to remain another month. The firm discussion is whether any man at this will be named to succeed Campbell in his double role. If the job is split, because it that the Aircraft Production Board post will go to an ex-industry man. LeMotte T. Collins, former president of General Motors, has been mentioned for the post, as has previously when Campbell was named last summer to succeed H. H. (Bill) Royer.

Catalina Airline

(McGraw-Hill World News)

Regato-A new airline, named Selva, has been registered in Liberia, to establish scheduled service in southern Colombia. One owner Catalina amphibian has been purchased from American and acquisition of another Catalina is being considered.



ROBBING'S "TEX" JOHNSON is 1-1 ft in need by other.



B-52 TEST PILOTS prior to making flight in new jet bomber



JEFFERSON up the back . . .

ADJUSTING the headpiece . . .



OPENING the face plate

AF Reveals High-Altitude Pressure Suit

B-52 test pilots in the above photographs show for the first time a new emergency pressure suit recently announced by the Air Force.

In designing the T-1 high-altitude suit, the Air Development Center at Wright-Patterson AFB, Dayton, had the advantage of a three-year period

may already made by a group at the University of Southern California. Beginning in 1945 this group investigated the physiological problems involved in performing a successful space suit, turning the whole matter over to the Air Force Aero Medical Laboratory in 1948. USAF realized that the problem of survival at altitudes where the air is a

new vacuum would have to be solved before the jet and rocket growth of the future could be developed, spent three years in intensive development work as its new program.

• **Combination Suit.**—In the first appearance below 30,000 ft a pilot's lungs must be supported as order to function, just concern three being maintained. At 65,000 ft, in the absence of some sort of pressure suit, blood will "boil," resulting in body expansion to twice normal size and almost instant death.

Elaborating earlier conclusions, gathered in pressure suits, the Air Force T-1 combines altitude protection with

anti-G suit, mask, helmet, cap, microphone, oxygen mask, goggles, dehydrator and oxygen bailout bottle. The T-1 is inflated automatically if other pressurization is lost. The problem of applying counter pressure to the surface of the body was solved by a new method and pilot's lungs are shaped with high-pressure breathing oxygen from the inflated suit and helmet, thus preventing his collapse.

• **Other Problems.**—During development work on the suit, one complicating factor was to make it adaptable to the varying sizes and shapes of the human figure. It was reported that the suit be mass producible.

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AERONAUTICAL ENGINEERING



EXCELLENT PERFORMANCE, easy maintenance and heavy load capabilities of American Helicopter's HO4S make Army team work.

Can Pulsejets Simplify Army Logistics?

- KH-26 lifts load twice its own weight.
- Packs into jeep trailer, uses jeep fuel.

By William J. Goughlin

Tormentor, Cold—Germany's V-1 buzz bomb was powered by pulsejet as prop, and at the end of World War II the U. S. Air Force reported big things of pulsejet. But the engine failed to live up to expectations, due to inherent limitations and lack of technical knowledge in this country. When the bubble burst, Air Force washed its hands of the project.

But when Air Force dropped pulsejet, the Army picked it up. What Army did with it has now been disclosed by American Helicopter, Inc., of Manhattan Beach, Calif., and West, Army. With air-minded Secretary of Army Frank Pace looking on like a proud father, American Helicopter unveiled its remarkable KH-26 single-place collapsible helicopter or turbine aircraft-propelled transport.

Just Another Copter?—What chatty cat was another helicopter, small and seemingly agile. But what the Army's top brass was talking about was a revolution in some traditional con-



SLEETLY TRUCK and known place of the future are two of the roles envisaged for KH-26 type with by Army Secretary Pace (on cockpit) and Lt. Gen. Strong (left).

cepts of warfare that goes far beyond present military applications of helicopters in Korea.

Coupled with the new Marine con-

cept of helicopter/infantry attack units which has been battle tested in Korea, it forecast multi-moving ground striking forces deal of the problem which has



1 Jeep brings mockup on trailer . . .



2 GIs remove XH-26 . . .



5 Rotor blades attached . . .



6 Copter fuselage is unfolded . . .



3 Copter is laid out on ground . . .



4 Skid gear is mounted . . .



7 Plexiglas cockpit panels put on . . .



8 In 20 mins. she flies.

been the nightmare of every ground commander-logistics.

The secret of the palmeto copter's future lies in its life. The XH-26, with its two massive pylons mounted at the rotor tips, can lift a load twice its own weight. American Helicopter already is constructing a palmeto rotor system for application to a helicopter capable of transporting four tons of payload. The Army expects the fastest military use of its palmeto helicopters is to come not as replacements for lumber plants but for Army trucks on short-led, heavy-load jaunts.

► **Within the Limit**—Army was pleased at Puch to be back in the air with the new development which adds such tremendous possibilities within the gross weight limit assigned to Army aviation. American Helicopter obviously has looked easy of the problems of the palmeto helicopter in this list of a family of such copters of various sizes.

"We will field test it and we will get it into production as fast as possible," said Secretary Pace.

► **Characteristics**—The XH-26 has been nicknamed the "jet-jeep" and its rugged

characteristics warrant the name. Designed as a one-man observation plane, the XH-26 can be modified to carry additional pylons or litters.

It is tough and simple. It can be carried in a jeep trailer, on one jeep trail and the company says it can be maintained with only a jeep fuel tank. It is the simplest and lightest helicopter ever built for the Army—lighter in its feet weighs 300 lb. empty, top speed is 50 mph, altitude is classified but the firm says it can reach altitudes comparable to existing conventional powered copters.

The XH-26 collapses into a 5 x 5 x 14-ft. container, can be dropped by air and assembled in 20 min. by two men. Tricycle gear is interchangeable with a skid gear.

► **Maintenance**—Simplicity of moving parts makes maintenance easy. "There are no gears or transmissions anywhere on the ship. The tail rotor, which is not an self-aligning rotor since no torque is generated in the fuselage with the rotor blades, is driven by belt. Purpose of the tail rotor is to oppose directional control, tail pilot Lou Har-

wing says failure of the tail rotor would not hamper the pilot except in high winds.

American Helicopter says the engine can operate 50 hr. without maintenance. They have only one moving part, the valve. Short 2 in. life of this valve part usually was one of the major obstacles to palmeto development, but American apparently has this solved. Life now is up to 50 hr. The valve can be replaced within a few minutes and replacement cost is low. Engines require no lubrication. They start easily at the end of the rotor and automatically assume a horizontal position when started, thereby making it possible to change blade pitch without changing position of the engine.

The craft has no hydraulic system and no electrical circuit is needed since the engine is started—it is this lack of conventional features which cuts down weight—and cost.

► **Fuel & Storage**—Fifty gallons of fuel, enough for an hour and a half of flight, is housed in the lower fuselage under the pilot. Small tank kept the fuel to the engine after it is pumped up the

side of the craft to a shaft, through a rotary shaft and out the leading edge of the blade. The XH-26 will fly on gasoline, kerosene or diesel fuel.

While it uses three times the fuel of conventional engines, the palmeto sets up only one-third the fuel required by a jet.

Engines are started by passing a battery on the control stick which ignites gas and fuel into the engine. An arrow from a compressed air bottle in the cockpit. A small push plug operates the mixture and the spark then is turned off.

► **Flight Characteristics**—Thirty seconds after test pilot Harwing passed the starter button he bounced 500 ft. into the air with a roar that echoed off nearby hills.

High making Army loss, as well as Navy and Marine observers, groined at the demonstration which followed. Test pilot Harwing on the XH-26 up and down like a yo-yo on a string, quailed and the observer in light circles swung back and forth like a pendulum, made hovering turns in both directions and flew past with hands off, starting with

crane helicopter users with this exceptional stability. Swift vertical climb and descent emphasized the craft's maneuverability and power.

While the combined cost of changing its heat only slightly, Harwing made a pass on single engine which demonstrated a two-engine reliability which helicopter man have been seeking. The maneuvers showed good high-speed performance, ease of control construction and positive directional control. Cutting the power at 500 ft. in a simulated emergency, he dropped the helicopter in a smooth, unobtrusive landing on the runway.

During a later flight for pass control, Harwing fired a red emergency when the copter ran out of fuel at its own greater height. With pylons spluttering wildly, he dropped on auto-rotation into a rough field with one "It's wonderful," he grinned as he in fact the craft took off again.

► **Development**—American Helicopter was organized in 1947, specifically to build a palmeto rotor-wing aircraft. When other firms gave up on palmeto and switched their research to the ma-

jet field, American Helicopter stuck to it.

In 1949 the Army came in as sponsor. Two experimental models were built, and a year and a half ago the Army noted American Helicopter to build the XH-26 under a contract administered by the Air Force. Airline and rotor development work was done at the firm's Winchester, Mass. plant, power plant development at Men, 20 mi. from Phoenix.

With well over 100,000 sq. ft. of production space available, the firm says it can reach high production rates on the XH-26 within a short time. Past flight tests were made less than those available now.

► **Advantages**—President Corwin D. Dewey lists several advantages of the palmeto copter.

- **Production costs** are estimated to be only one-fourth those of equivalent conventional powered machines.
- **Cost in labor and material** and money of maintaining the palmeto in the field is estimated to be only one-fourth that of comparable aircraft.
- **Significant weight reduction** resulting

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RG-59	21-624	75 ohm	195	Polyethylene
RG-62	21-022	75 ohm	242	Polyethylene
RG-75	21-028	93 ohm	242	Polyethylene
RG-80	21-004	32 ohm	485	Polyethylene
RG-88	21-012	32 ohm	670	Polyethylene
RG-92A UHF	21-350	30 ohm	425	Teflon
RG-93	21-302	30 ohm	185	Teflon

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be on its application in engineering aspects replacement of tracks and lifting of supplies?

That is the question that First Gen Seng and John Army have had many change workers. With fleets of helicopters to move supplies forward, to lift a prop in a motor over a nose or more, the Army no longer will have to depend on roads. It will become a mobile, continuously striking unit. What this means has already been demonstrated by the Chinese drive, which found itself from south out by taking to the air but in employing considerable labor to move supplies.

Present slow, inefficient and costly road maintenance will be unnecessary if this means of an army supply by helicopter comes true. Logistics is not the only aspect. The Army has been under congressional fire for waiting manpower. The high lift of the helicopter could also help solve that problem.

"We can take those men away from road maintenance," says Gen Seng, "and get them up front with a gun on their shoulder."

British Missiles Near Production

Britain's guided missile development now achieves activity at more than 100 lines and "— in rapidly increasing the proportions of — a new industry," according to Dennis Smedley, the Minister of Supply.

Smedley, who was visiting the Ministry of Supply experimental rocket installation at Abingdon, South Wales, was quoted by the British press as saying that Britain is "inches from the final stages of putting these fantastic new weapons into production."

Space Details—Although prevented by military considerations from giving actual performance figures, Smedley said that the guided missile being developed could travel well over 2,000 mph and at altitudes considerably higher than those contemplated for bomber operations in the years to come.

Maneuverability of these weapons is on the order of four to five times that of a fighter plane, Smedley said.

Some indication of the sophistication of the program was also supplied by Smedley. He stated that basic research had been done largely by the government's experimental establishments. Results of that research now made available to selected firms who were asked to develop specific product designs for various operational uses.

New laboratories, firing ranges and other facilities had to be provided on a considerable scale, he added, and currently plans are being made for factory capacity for the production of the new weapons.

Radiography checks—



then double checks

LANDING GEAR STRUTS lead a life of punishment. Though light, they must be strong. Their joints must be sound. Radiography is the method used to prove them sound.

A maker of airplane aircraft goes even further. Though treated and welded, strut members can develop internal corrosion and become weakened. Radiography alone can provide the required non-destructive examination of these internal surfaces, so it has become routine to x-ray these struts as part of the periodic inspection of the planes.

This is but one example of how radiography is proving a boon to the welding process. It is helping to open new fields for the use of welding—especially in the fabrication of highly stressed products and assemblies.

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TRADE MARK



JAVELIN TAILPIPER now extend farther back than on first prototype. Spaceway chute housed in fin-top during will be discarded after development of several recovery techniques.



BULLET With intercession of Bullets' horizontal and vertical tail, reducing flow separation and strong vertical Mach number. Internal sources say that single fin got Bullets over the drag hurdle into supersonic flight.



SWIFT'S BLACK EYE in gun covers. This position for direct line-of-sight observation for only two seconds in forward body. Boundary layer is disturbed by one blood-draw, rapped tail fin.



BUTTERFLY TAIL of Superhawk III. One base of missile from antenna with nose-mounted movable control surfaces. Finest tail cone moves. Bullet fining at end of forward is now this year.

Camera Reveals British Design Details at SBAC Display (Story begins on page 32)



NOSE TURRET and gunner's position on Arrow. Shown in M1, 2 are mounted above headlight's window. Guns are twin 20-mm cannons. Other design characteristics: movable radars and tail absorption position.



OPEN NOZZLE of Bullpup Arrow with alternative, is supplied in modified English Electric Canberra, shows new solution in position of variable area opening. In closed position, nozzle looks stepped.



SKEETER INSIDE in fully reloaded. Engine is Cirrus Bombardier. Developed by Combs, small engine was bought by West.



SPRITE ROCKET and armament as installed in the prototype. de Havilland Comet jet transport. Not currently associated to recovery with Comets, the DH Sprite engine may lead the way to further development with so-called "solid propellant" for solid boost.



MISSILE by Royal is likely to be used. Main body contains inert controls and interlocking equipment. Rocket engines are of 6-in. diameter, and single pilot or manual-dock air intake makes them capable of sports in low supersonic range. Based on base gas of 7.5 in. combustion propellant rockets arranged in tandem. Flight velocity is slightly over Mach 3.0 at end of boost.

CONTROL TESTS see the prime purpose of the vehicle exhibited by the Ministry of Supply. Large rocket are for 30, small tandem jets for control. Three standard Rato units boost the missile to high speed.



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This logarithmic chart shows the effect of these factors as the sheet metal part is thinned. From 1 to 130 parts, one over Machine-Cut Method with no die cost when metal is most economical. At 130 parts, the Sheet-Roll Method using economical thinking, dies and steady punches, is best. At 10,000 parts, the stamping and Production Method with standard dies is most satisfactory.

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DELTA AIRCRAFT exhibited by Farnley Research and Assembly, Inc. is rocket-propelled and autopilot-controlled. Presently a test vehicle, model resembles F4U delta plane.



WINGS FOLDED de Havilland Sea Venom shows small leading edge flap that is retracted end of wing and wing fence inboard for stream control at high angles of attack.

SBAC Design Details (More pictures on pages 30, 31)

By David A. Anderson

Barnborough, England—The Society of British Aircraft Constructors' display at Moscow to aircraft designers. Nowhere else in the free world can any engineer find greater confidence in design engineer's opinion as carefully as the contemporary planes in his industry.

Without exception, without armed guards, without time limit, the technicians can view over an aircraft, look inside the cockpit and poke his head into the wheelwell.

Scrambled flight displays present the best performance of the planes. But it is in the static displays in the aircraft park and in the huge exhibit tent that the engineer spends most of his time. After you've seen one blurring display, you've seen them all, but you never tire of looking for detail, for design

ideas and new gimmicks.

These are the features that one makes or loses an aircraft, that make it go, that make it fly, that make it a fighting machine as a day.

The designers' display on these pages presents a set of reference for the designer's view of aircraft engineering in Britain.

Free Pushy. Many of the jet engines seen on the planes at Barnborough were equipped with free pushy, pairs of rod spring-loaded doors placed at strategic locations in the skin of the component itself. Size is about 5 in. square, big enough to insert the needle of a flux extruder.

Panel doors swing in, and normally, one flank fitting, simple tension springs keep them closed under light loads (judging by the view of one of these doors,

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Bolt—Clevis, AN23 to AN32
Bolt—Aircraft, Drilled Head, AN73 to AN81, AN73A to AN81A
Bolt—Aircraft, Close Tolerance, AN173 to AN182
Bolt—Hex Head, AN183001 to AN181900
Bolt—Hex Head, Drilled Shank, AN181901 to AN182800
Bolt—Drilled Hex Head, 4 Holes, AN102801 to AN1033703
Bolt—Drilled Hex Head, 6 Holes, AN1033701 to AN104400

NUTS

Nut—Castellated, Airframe, AN310
Nut—Flange, Airframe, AN315
Nut—Check, AN316
Nut—Flange Hex, 1/2 in. Dia., 3/25
Nut—Castle N.A.T. 330
Nut—Flange Hex (Close Thread) AN335
Nut—Alight Hexagon (Close Thread—Hex Thread, AN340—AN345)
Nut—Engine—Wetted, AN355
Nut—Flange Engine, AN360

PINS

Pin—Center, AN380
Pin—Center (Close Thread—Hex Thread) AN381
Pin—Flat Head, AN392 to AN398

SCREWS—Slotted

Screw—Fillister Head (Close Thread—Hex Thread), AN300—AN301
Screw—Fillister Head (Drilled Head—Close Thread—Capitol), AN300A—AN301A
Screw—Drilled Fillister Head Machine (Close Thread—Close Thread), AN302—AN303
Screw—Machine, Round Head (Close Thread—Hex Thread), AN315—AN320
Screw—Washer Head, AN325
Screw—Machine, Truss Head, AN326
Screw—Sheet Metal Round Head, AN330

SCREWS—Phillips Recessed

Screw—Machine, Flat Head, 8° (Close Thread—Hex Thread), AN305—AN310
Screw—Machine, Round Head (Close Thread—Hex Thread), AN315—AN320
Screw—Machine, Truss Head, AN326
Screw—Machine, Flat Head, 100°, AN327
Screw—100° Flat Head (Close Thread), AN328
Screw—Bracket Head, NAS220 to NAS224
Screw—Sheet Metal Round Head, AN330
Screw—Sheet Metal Flat Head, AN331
Screw—100° Flat Head, Alloy Steel, C1225 to C1228

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Engineering Data Available

ADAMS-RITE MANUFACTURING CO.

800 WEST CHERRY CHASE DRIVE, GLENDALE 4, CALIFORNIA, U.S.A.



ROCKET MOTORS In full of
fantasy
this exhibit is representative of Ralston
desks. Two motors are mounted in front
bars pass through slant areas of gravity.



they would appear to be SRAC stand-
ards.

Robert Nozle-The de Havilland
Ghost 101R has a different kind of
dimensional attack. Most of the
system known for its long and the ex-
treme end of the telescope as the
variable-area discharge nozzle, and have
featured sheet metal fabrication. The
uses a heavy cast, partially tapered, some
distance between the discharge nozzle,
and light on the vertical center
line.

Sketch above shows the general
idea, although relative sizes are ap-
proximate. Accuracies of the model is
hydraulic. The two actuators are
connected on the outside of the tail
pipe on a horizontal plane through the
flange line.

Like most engines on display, the
Ghost 101R had several times block-
ing the view up the tailpipe, that an
observer could get no idea of the
method of fuel distribution. This en-
gine was demonstrated in flight on a



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MAGNESIUM



In the design of high-speed wings, the designer, by the use of a thick skin, can accomplish such improvements in lift and moment advantages illustrated at left as in a completely lighter plane wing made with magnesium. Note the simplified construction. Although this wing, ready for flight, weighs no more than a conventional wing, it is rated ready for lift as increased 50%. By using a thick magnesium skin all sparwise structures and had the ribs even eliminated, reducing the number of parts 60%, the number of fastenings 60%, and adding fuel capacity that increased the plane's range 180%.

Without the combination of strength and light weight as a design necessity, link is superfluous. Recent technical advances in alloying, lubricating and finishing have made engineering a leading metal for use in construction.

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Dow



	Wald (1) Gasoline	Aggressive	Control
Real output pressure, pt	2.1	0.11	<0.1
Flash point, deg. F	-0.00	-0.00	<0.00
Freezing point, deg. F	<-0.00	<-0.00	<0.00
Colorful value, Hrs. gal	143,400	179,000	114,000
Colorful value, Hrs. ft	35,200	10,400	10,400

• **Rocket Motor**—Although all the graded waste was disposed at Farmborough has been around for a long time, designers could take it one from the methyl poisoning of the Brix 11 powerplant. The unit has a thrust of 1,800 lb. for a duration of 40 sec. Fuel is a mixture of methyl alcohol, hydrazine hydrate and water, oxidizer is hydrogen peroxide.

The rear 40% or so is filled by the rocket motor itself and a pair of air-seal discharge drums, from the strong granules which direct the fuel and oxidant gases.

► **Turbo-prop Fuel**—The first engine on exhibit to fly on the fuel used by commercial airlines is the Pratt & Whitney JT8D turbo-prop. The engine is powered by the Armstrong Siddeley Double Mamba turbo-prop engine, and has been flying for some time now on a fuel called ground fuel in the United States, a mostly common

The table above gives the comparison of properties of ground-rode cements and cements, all of which are used in the Maraca. Although the lower caloric value per pound of fuel indicates the engine must combust the higher caloric content per unit volume more, this offsets the possible loss with increased weight on engines.

★Aerodynamic Boost—When the Bristol Britanni took off in the gusty conditions which obtained at least two days of the flight display, always with impressed with the rapid long-throw of the long sniffer. The reason: Bristol's aerodynamic boost system developed from pioneering work done at the Royal Aircraft Establishment.

1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 2163, 2164, 2165, 2166, 2167, 2168, 2169, 2170, 2171, 2172, 2173, 2174, 2175, 2176, 2177, 2178, 2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208, 2209, 2210, 2211, 2212, 2213, 2214, 2215, 2216, 2217, 2218, 2219, 2220, 2221, 2222, 2223, 2224, 2225, 2226, 2227, 2228, 2229, 2230, 2231, 2232, 2233, 2234, 2235, 2236, 2237, 2238, 2239, 2240, 2241, 2242, 2243, 2244, 2245, 2246, 2247, 2248, 2249, 2250, 2251, 2252, 2253, 2254, 2255, 2256, 2257, 2258, 2259, 2260, 2261, 2262, 2263, 2264, 2265, 2266, 2267, 2268, 2269, 2270, 2271, 2272, 2273, 2274, 2275, 2276, 2277, 2278, 2279, 2280, 2281, 2282, 2283, 2284, 2285, 2286, 2287, 2288, 2289, 2290, 2291, 2292, 2293, 2294, 2295, 2296, 2297, 2298, 2299, 2300, 2301, 2302, 2303, 2304, 2305, 2306, 2307, 2308, 2309, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2318, 2319, 2320, 2321, 2322, 2323, 2324, 2325, 2326, 2327, 2328, 2329, 2330, 2331, 2332, 2333, 2334, 2335, 2336, 2337, 2338, 2339, 2340, 2341, 2342, 2343, 2344, 2345, 2346, 2347, 2348, 2349, 2350, 2351, 2352, 2353, 2354, 2355, 2356, 2357, 2358, 2359, 2360, 2361, 2362, 2363, 2364, 2365, 2366, 2367, 2368, 2369, 2370, 2371, 2372, 2373, 2374, 2375, 2376, 2377, 2378, 2379, 2380, 2381, 2382, 2383, 2384, 2385, 2386, 2387, 2388, 2389, 2390, 2391, 2392, 2393, 2394, 2395, 2396, 2397, 2398, 2399, 2400, 2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408, 2409, 2410, 2411, 2412, 2413, 2414, 2415, 2416, 2417, 2418, 2419, 2420, 2421, 2422, 2423, 2424, 2425, 2426, 2427, 2428, 2429, 2430, 2431, 2432, 2433, 2434, 2435, 2436, 2437, 2438, 2439, 2440, 2441, 2442, 2443, 2444, 2445, 2446, 2447, 2448, 2449, 2450, 2451, 2452, 2453, 2454, 2455, 2456, 2457, 2458, 2459, 2460, 2461, 2462, 2463, 2464, 2465, 2466, 2467, 2468, 2469, 2470, 2471, 2472, 2473, 2474, 2475, 2476, 2477, 2478, 2479, 2480, 2481, 2482, 2483, 2484, 2485, 2486, 2487, 2488, 2489, 2490, 2491, 2492, 2493, 2494, 2495, 2496, 2497, 2498, 2499, 2500, 2501, 2502, 2503, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2512, 2513, 2514, 2515, 2516, 2517, 2518, 2519, 2520, 2521, 2522, 2523, 2524, 2525, 2526, 2527, 2528, 2529, 2530, 2531, 2532, 2533, 2534, 2535, 2536, 2537, 2538, 2539, 2540, 2541, 2542, 2543, 2544, 2545, 2546, 2547, 2548, 2549, 2550, 2551, 2552, 2553, 2554, 2555, 2556, 2557, 2558, 2559, 2560, 2561, 2562, 2563, 2564, 2565, 2566, 2567, 2568, 2569, 2570, 2571, 2572, 2573, 2574, 2575, 2576, 2577, 2578, 2579, 2580, 2581, 2582, 2583, 2584, 2585, 2586, 2587, 2588, 2589, 2590, 2591, 2592, 2593, 2594, 2595, 2596, 2597, 2598, 2599, 2600, 2601, 2602, 2603, 2604, 2605, 2606, 2607, 2608, 2609, 2610, 2611, 2612, 2613, 2614, 2615, 2616, 2617, 2618, 2619, 2620, 2621, 2622, 2623, 2624, 2625, 2626, 2627, 2628, 2629, 2630, 2631, 2632, 2633, 2634, 2635, 2636, 2637, 2638, 2639, 2640, 2641, 2642, 2643, 2644, 2645, 2646, 2647, 2648, 2649, 2650, 2651, 2652, 2653, 2654, 2655, 2656, 2657, 2658, 2659, 2660, 2661, 2662, 2663, 2664, 2665, 2666, 2667, 2668, 2669, 2670, 2671, 2672, 2673, 2674, 2675, 2676, 2677, 2678, 2679, 2680, 26

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is on the ground. The team control



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1. Explosive rivet is inserted in drilled hole. Green action shows rivet to shock action using atomic explosive charge.
2. Top of explosively heated Du Pont Rivet head is applied to rivet head, doing change. Rivet shaped head is shaped and locks rivet permanently in place.

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A Product of Du Pont Research



1800 AMMUNITION

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surfaces, being due to float or induce out at any position, do so, while both rivets may be it full up defects.

► **Tip Shot**—The de Havilland Sea Vixen was packed in the state duplex with system mounted on failed wing. At the extreme outer end of the wing is a small leading edge fixed slot, hardly more than one inch apart. This detail and the wing inner do the in bond action of the outer panel, probably, since the same aircraft purpose—that of maintaining aileron control at high angles of attack. The case slot is also in the Vixen night fighter.



LOCKHEED DEVELOPED metal plate design panel covers full length of F-99's wing leading edge. Heating elements are very bending in from wing-leading junction. Tube extending over wing area is for test spray.

New De-Icer Boot Effective on Jets

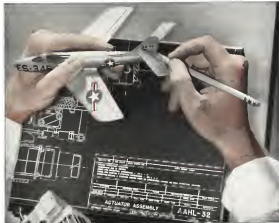
De-ice boot consists of keeping pace with high-speed plane design.

A new metal-and-plastic sheet, electrically heated for ice removal, is being used to keep clear the wing and tail leading edges of an F-4 Phantom. Lockheed Aircraft Corp.'s new retro-spective. Initial flight tests on the plane have proved that the metal-plastic design can do the job, the company's chief research engineer, G. L. Johnson, reports. Chained advantages:

- Aerodynamically clean construction, a key high-speed feature.
- Quick response to heating current.
- Uniform surface temperature distribution.
- Cuts out water buildup, interfering.

The result is a two-year research program at Lockheed, the boot is a silver-copper plastic sandwich bonded to an aluminum alloy base. It operates at 40 watts (a.c.) per sq. in., applied for 100 periods at 10-min. intervals under wing conditions. As much as 75 watts can be applied, if required. At the design's base, the ice on bond on the wing or tail surface, the ice and water are blown away by the air stream.

Though the boot primarily was designed for military planes, report is that it will be adaptable for transports.



Self-Locking Hydraulic Actuator

"Designed to fit the job," describes Aeroproducts' new hydraulic self-locking actuators. They lock in any position without pre-selection or positioning—they stay in that position until released. As pre-protection assemblies may be coupled for absolute simultaneous action. They feature manual, electrical, or pneumatic operation in case of hydraulic system failure. Design have been approved and are being used for variable control surface applications and are being studied for jet engine variable nozzles, guided missiles, and other including commercial use.

Definite application of this unit now being studied for production are for Republic F-105 Hydraulic Fuel • McDonnell F-201 Horizontal Stabilizer. Other commercial.

APPLICATIONS

- Stabilizer Control
- Jet Engine Variable Nozzle Control
- Bomb Bay Door
- Cargo Door
- Bomb Bay Door
- Landing Gear
- Variable Wing Incidence
- Target Control
- Prop Actuator
- Canopy and Seat Control
- Aileron Control



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RCAF VAMPIRES are fed by dependable Pesco fuel pumps

The powerful DeHavilland Goblin jet engine that powers this sleek sky rider demands plenty of fuel at all times. Pesco fuel pumps have been selected as the replacement pump for all Vampires now in operation by the Royal Canadian Air Force.

This Pesco pump costs less originally, yet gives greater reliability, longer service life, and reduced maintenance costs. That's why more and more plane manufacturers and operators are using Pesco products for controlled flow of fuel. Pesco's skilled craftsmen have provided the precision-made fuel and hydraulic pumps and controls that are standard equipment on all types and makes of planes. It is experience and know-how that can help you.

Pesco fuel pump model 44240-016 (top)—7000 revs. of over-the-piston fuel pump operating pressure 1400 psi.



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2470 NORTH HURST ROAD
BIRMGHAM, OHIO

PRODUCTION



HULL CENTER section of Navy R3Y-1 being moved back to cradle (background, right picture) by monorail crane.

How Convair Puts Navy R3Y-1 Together



Navy's R3Y-1 night transport, sea son of the experimental XP3Y-1 turboprop patrol flying boat—has reached the final assembly stage at Convair's Vickers Aircraft Corp.'s San Diego division.

Part of the 50-ton R3Y-1 all the line will go to static test, while the flying article—the second production plane—is scheduled for takeoff next March.

► Turboprop T40—Power for the plane will be from Allison T40s trained with contra rotating propellers, developing a total of about 22,000 hp. The permanent crank has a length of about 170 ft., with length to base area of 39 ft. and a disk 116 ft.

Design top speed exceeds 350 mph (static test) in a cabin of about 30 ft. The R3Y-1 is the world's first turboprop flying boat and was the first hull-craft plane developed from Convair's division model research program. The XP3Y-1's power was set with a 1/10-scale model, radio controlled. It weighed about 125 lb., was powered by four engine pumps, engine developing 14 hp.

More than 2,000 test runs were made with this dynamically similar model—practical research tool that showed

► HOPING FOR RENDEROUS: No. 1 R3Y-1. They will be joined for static testing of the structure. No. 2 replace will fly first.

**Vibration
Engineering
that solves
your problems**



PROBLEM: To perform vibration tests to MIL-8-3272 specification.

SOLUTION: The MT Model C-21 Vibration Exciter rated at 2500 pounds force.

Shota's testing gives a quick method of developing a product to withstand various loads. Such testing is vital in aviation. To meet the need, AIR has applied its specialized vibration engineering to develop a range of shakers in various settings for testing everything from aircraft doors to staircases.

The big C-80 model develops large "brake forces" to meet vibration requirements of applications MIL-STD-883C. It has heavy duty capacity for a wide range of work, including fatigue testing, shock testing of all types of electronic, electrical and mechanical assemblies.

One of the largest and most dependable electromagnetic shakers available, the ODS model is a good example of vibration engineering that has made ME "headquarters" for products to design, control, reproduce, detect, or measure vibration. More information on shakers is Bulletin No. 1-NV. Write or

The widely used Federal #1000, however, is produced in



MANUFACTURING COMPANY, Inc.
10427 State Street, New Haven, Ct. Conn.



NOTE: SCLERON, on inside, horizontal, and center section will soon be joined



WAY I FIGURE, though somewhat, clearly shows plane's long, long line



NTFY-1, world's first turbofan flying wheel, is superior to Conquest NTF-1

velopment time and expense, additionally affording a factor of safety in pointing out the merits of the prototype before actual construction.

The distributions above and on p. 40 show how Corcoran makes the massive major components of the RTT-1 at the San Diego facility.

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^aCounter rotation
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¹¹ On this point, see also, for example, *United States v. Williams*, 199 F.3d 1168, 1175 (9th Cir. 2000).

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permanently. For a short time, the bird was
in the hospital, but it was not able to fly.
It was released on 10/10/1991. It was
seen on 10/10/1991. It was seen on 10/10/1991.

[illegible]

WESTERN GEAR WORKS

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W-3A SYSTEM is broken down into seven boxes, making installation in space-constrained F-94C easier. Only one of each component used is shown in display above.

Radar Orders Fly W-3A Autopilot

F-94C's Westinghouse autopilot reveals new role as target tracker; indicates possible design trend.

By Philip Kline

The Westinghouse W-3A automatic pilot such as the Lockheed F-94C marks the beginning of a new era for autopilots. It is the first production autopilot specifically designed to enable an interceptor to track down a target automatically by taking its commands directly from the plane's radar and computer.

Previously autopilots have been considered neutral accessories which could relieve the human pilot of routine flying chores. Now they become a vital link in an interceptor's offensive armament system.

► **Design Highlights.** From a design standpoint, the W-3A is noteworthy because it:

• Uses hydraulic actuation instead of electric motor servos to position the airplane control surfaces.

• Uses three rate-type gyros, but no vertical gyro.

• Allows pilot to use autopilot for unattended (160-deg) airplane maneuvers about one min.

• Uses magnetic amplifiers in place of vacuum tubes as its servo amplifiers and in several other amplifiers.

The W-3A can fit several other "fits." It is Westinghouse's first pro-

duction entry in the highly competitive autopilot field which includes Minneapolis-Honeywell, Lear, Sperry, Ekco-Pittman, and General Electric. The W-3A is also believed to be the first USAF light-type autopilot to be purchased by the surface manufacturer (Lockheed) rather than being furnished by the government. In this respect it is a continuation of the trend started when Boeing obtained USAF approval to select the Sperry A-122 for its B-47 Stratofort.

► **Passive Status.** Neither Westinghouse nor Lockheed will say much about the present status of the W-3A on the F-94C, but reliable sources say that there are still some autopilot airplane stability problems to be solved out. The solution to such problems can only come from flight tests, and other airplane problems have repeatedly outmanned the autopilot as priority.

For security, and possibly competitive reasons, Westinghouse isn't releasing too many details on its W-3A. It has listed the well sufficiently to reveal some interesting autopilot techniques.

The autopilot has an installed weight of about 150 lb, Westinghouse says. This makes it lighter than the Navy's



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FLIGHT CONTROLLER permits pilot to
fly plane by means of autopilot

C-5 (General Electric) and heavier than
the USAF's Lear 3-5. The autopilot is
produced in 15 separate components, to
permit it to be fitted into the space-
cramped P-40C.

► Four Modes of Operation—The W-3A
gives the P-40C pilot a choice of four
different modes of operation. They are:

• **Cruise.** This provides conventional
select type autopilot operation in which
the system maintains the airplane on
an desired compass heading and at
constant barometric altitude. The bar-
ometric pilot can glide down, or turn the
plane through the autopilot, with some
course modification provided during
turns.

• **Boost.** This unique arrangement is
used when the pilot wants com-
plete 360 deg freedom of maneuvering
about two or more airplane axes. Air-
plane pitching, yawing or rolling (not
turning) into a preselected or displaced
mode of the flight controller about the
corresponding axis. The human pilot
must provide turn coordination in this
mode.

• **Roller.** The autopilot is connected to
accept command signals from the
P-40C's radio-computer and to convert
the airplane into firing position
against the target.

• **ILS.** The autopilot is coupled to the
output of the ILS receiver and glide-
path receivers to enable it to maneuver
the airplane down the ILS beam for a
landing.

► Flight Controller—General head-
quarters for the W-3A is the flight
controller which mounts in the pilot's
cockpit console. It contains a rotary
selector switch which the pilot uses to
choose the desired mode of operation—
cruise, boost, cruise, roller, or
ILS (descent, or barometric pilot glide
slope).

The controller also contains the auto-
pilot master on/off switch. Three toggle
switches on the controller make it pos-
sible to designate individual autopilot
channels should the pilot want to fly
one or more axes manually in the

Fastener Problem of the Month

Fasteners for air and highway service

October 1962



PROBLEM: The And service planned for the Aerojet "Flying Auto
mobile" posed a special fastening problem for an manufacturer, Aerojet,
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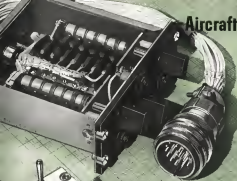
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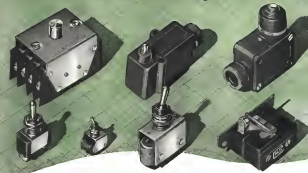
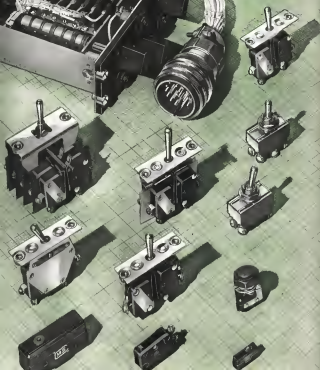
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AVIATION WEEK, October 31, 1962



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even one autopilot channel should fail.
• **Magnon**—The boom pilot enters down-on-view by operating a control sphere-shaped control which is coupled with a variable load. During course mode, the pilot maintains in pitch by displacing the sphere about its pitch axis. This gives a rate of climb or descent proportional to sphere displacement. In roll, no displacement of the sphere has no effect during course mode. Rotating the top knob gives coordinated turn whose rate of turn is proportional to knob displacement from neutral.

During boom mode, the flight can make turns independent of course maneuvering. Turn-off displacement of the sphere gives proportional airplane pitching rate, roll axis displacement of the sphere gives proportional rolling rate (winging) rate. Displacement of the top knob in boom mode gives the airplane a proportional wing rate.

The flight controller also contains a course trim knob for making small heading changes. This small rotating light on the controller shows the pilot when the autopilot and the ILS approach angles are in agreement.

• **Return To Hydraulic-WA** waits the return to hydraulic servo actuators used in World War II autopilots. All ports in autopilots until the W-3A have used electric motor servo actuators.

There are two reasons for this change,



MAGNETIC AMPLIFIERS in plane cartridges replace vacuum tubes in W-3A servo-amplifiers.

and possibly a trend to hydraulics.
• **Hydraulic** actuators are faster, generally than electric motor servos and high response is needed to stabilize speed jets.

• **Autopilot** can be integrated once of feedback, as a rule, with the airplane's hydraulic boost system of the two systems above a constant accuracy.

The F-4C has a Lockheed-designed hydraulic boost system for elevators and ailerons, the rudder is usually controlled. Each of the two boost servos is controlled from its own Lockheed finished boost valve whose stem is actuated by displacement of the pilot's control stick. This valve stem leaves vent controls the flow of hydraulic fluid to the piston actuator which moves the control surface.

To tie the W-3A into the aileron and elevator boost system, Westinghouse provides two identical electromagnetic control valves, one for each channel. The finished valve concerns the different return current output from the autopilot servo amplifier into a proportional hydraulic flow to operate a small piston which in turn displaces the Lockheed boost valve stem.

In this case, autopilot signals are converted into boost valve displacement which in turn operates the control surface actuators. When the F-4C is being flown manually (without autopilot), the small boost valve piston sets in a danger cylinder reflect them as an actuator.

• **Dead Follow-Up Signals**—The aileron and elevator channels provide two dead follow-up signals for stabilization purposes.

• **Conventional displacement-type signal** generated by a potentiometer driven from the control surface.

• **Rate-type signal** generated by a small linear potentiometer driven by displacement of the Lockheed boost valve stem. Valve displacement provides a rate type signal because the rate of hydraulic flow through the valve (and hence the rate of control surface actuator movement)

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is continuously controlled to provide gyro damping.)

The three rate gyros are mounted as a single unit, called an angular rate control. Each gyro has its own set of magnets designed to detect motion about a different one of the airplane's three principal axes, i.e., pitch, roll, and yaw.

► **Rate Gyros in Boost Mode**—During the boost mode of operation, displacement of the flight controller inputs, in roll or pitch, applies a signal to the torque coil of the roll or pitch rate gyro. This displaces the gyro from neutral, generating a signal which is amplified in the couplant (servo amplifier) and applied to the electromechanical control valve causing the corresponding control surface to be displaced.

As the airplane develops an angular rate about that axis, the rate gyro develops a precession torque which opposes the torque coil signal. When the airplane's rate reaches the value called for by flight controller displacement, the gyro element will return to neutral and the airplane will continue to pitch or roll at the same angular rate.

When the flight controller is returned to its rest position, the system will halt airplane angular movement, leaving it in whatever attitude it was in when the controller was centered.

The yaw channel differs from pitch and roll in that its rate gyro torque coil is used solely for gyro damping purposes. When the flight controller knob is displaced in yaw, its command signal is fed directly to the servo amplifier to displace the rudder. The rudder servo will the yaw rate gyro is displaced indirectly by airplane yawing to develop a signal which will cancel the original controller signal.

► **Rate Gyros in Cruise Mode**—During cruise mode, any angular movement of the airplane will cause the rate gyro aligned to that axis to precess and generate a signal which the computer control surface deflects. This will damp out unwanted angular motions. However, it won't keep the airplane on a selected compass heading or at a selected altitude.

To maintain altitude and heading, Westinghouse uses two additional rate gyros; the barometric vertical rate gyro and the 22 gyro stabilized compass. Each functions, in a sense, as an integrator to keep track of continuously changing altitude or heading changes. Each provides a signal to its respective channel to actuate control surface action to return the plane to its previous heading or altitude.

► **Vertical Rate Control**—The vertical rate control device gives two signals to the pitch channel to maintain the airplane at constant altitude. One is a displacement signal indicating the plane's total deviation from the selected altitude. The other signal is proper

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toward the rate of deviation from the
selected altitude.

The vertical rate control uses a dual-
chamber type of second element which
has one chamber continuously vented to
the static line, a second chamber is
ventilated to the static line only when the
barometric pressure is increasing at a pitch
flight controller opens out of constant
pressure. When the system is returned
to center, the second second chamber
is sealed off, trapping air at the pressure
altitude at which the vertical rate con-
trol will maintain the airplane.

When the pitch movement is pitch
while in cruise mode, the flight con-
troller generates a signal which biases a
torque motor on the vertical rate con-
trol. Under these conditions the vertical
rate control calls for no elevator deflection
until the airplane's rate of climb or
descent reaches a limit on the rate dia-
phragm which controls the torque
motor signal.

► **Trim Coordination** — Wingshaper
uses a novel device for coordinating
trim during the cruise mode. Rotating
the flight controller knob displaces the
rod proportionately and simultane-
ously produces a transient signal into
the roll rate gyro. This in turn causes a
secondary alarm deflection putting
the airplane into a banked turn. The
larger the knob deflection, the larger the
transient signal to the roll gyro, and the
larger the alarm deflection.

The coordination signal causes a
roll procedure within the roll gyro
case. The procedure is printed in each
way so it can be quickly and easily
rechecked. During cruise mode
trim coordination is provided the
pitcher is mechanically coupled to
the roll gyro gimbal by means of a side
rod so it is applied precisely together
to the gyro. During other modes of
operation, the procedure is decoupled.

When the alarm deflection is not
sufficient to produce a coordinated turn
at the particular amount of rate dia-
phragm, the procedure will apply a
pitching torque to the roll rate gyro,
discharging it and generating a signal to
call for more or less alarm deflection.
► **System Synthesis** — Wingshaper
has now a novel method of synthesis
using the computer to the airplane's
altitude to prevent sharp transients
when the autopilot is engaged. Prior to
engagement, and coordinating rate
on so the flight controller continuously
pushes the trim knob and the sphere
about its base and pitch axis to seal out
any signals in the control system (the
sphere remains spring-centered in roll).

With the autopilot in standby con-
dition, the pitch and trim controls will
follow any airplane movement introduced
by the human pilot using the
F-4C's manual controls.

► **Other Features**—Other features in
the W-3A include:



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• Elevator trim tab servo which operates to remove steady state loads from the main elevator servo actuator, except during steady and radar mode conditions.

• Pitch trim indicator to show pilot whether airplane is properly trimmed about the pitch axis prior to dissipating the system.

• Junction box which provides a one section motor for the autopilot and contains relays used to change from one operation mode to another.

• Compass complex which senses to readily signals from the J-2 compass and "indicator" is electrically from W-3A. • Approach Complex-The W-3A J-2 approach complex assembles, from an operational viewpoint, those used in other autopilots such as the Sperry A-32 and the Lear F-5. The location boxes may be substituted at angles up to 90 deg., Westinghouse says.

When the selector switch on the light controller is positioned to "Local use and Glide Slope," a rate of descent signal corresponding to a 3.0 deg. pitch-down attitude is automatically introduced. This signal serves to smooth out minor ripples in the glide slope beam.

• Limited Danger Operation-The yaw or pitch channels of the W-3A can be used individually to perform as a yaw or pitch damper. However, the yaw channel will oppose a known pilot as turned turn, an undesirable condition.

• Reliability and Maintenance-Although care to the autopilot field, Westinghouse's W-3A gives evidence of considerable design attention to reliability and simplified maintenance. For example, Westinghouse has replaced vacuum tubes with self-sustaining magnetic amplifiers wherever possible. Its correlator (power amplifier) was redesigned entirely. Only the approach complex and compass complex are vacuum tubes.

Magnets in the correlator have also been packaged in plastic type boxes for easy replacement. Where vacuum tubes are used, Westinghouse has gone to shielded construction in which the tubes, reaction, capacitors, etc., are "potted" in place in type containers. Westinghouse also reports that it has included such accessible voltage-check points in its patchwork box.

Ohmmeter and Megger

New Model C-3 resistance meter can be used both as an ohmmeter and as a low-voltage megger for checking leakage resistance. Device will measure resistances in the range of zero to 6.5 megohms as an ohmmeter; leakage resistance in the range of one to one million megohms as a megger. Meter is made by Southwestern Industrial Electronics Co., 2811 Fort Oak Road, Houston 19, Tex.

COMFORT

on the line!

NEW mobile aircraft air conditioner by Airtemp
brings complete all-weather comfort to airliners
with *South Wind* heaters



Complete on-the-ground, all-weather comfort for airline passengers is achieved by this new mobile air conditioner by the Airtemp Construction Corporation.

Airtemp chose Stewart-Warner South Wind Heaters, acknowledged leaders in the field of aircraft heating, for dependable cold weather operation. The heater supplies up to 200,000 BTU's—more than ample, even for arctic opera-

tion—direct to the plane's own ventilation system. Stewart-Warner supplies the electric fuel pumps and instruments, as well.

Already chosen by Chicago and Southern Air Lines, United Air Lines and Capital Airlines, the unit is finding ready acceptance by the industry for its dependability and ease of operation. Another example of South Wind leadership.



Left hand panel of unit with engine door open for inspection or service there is direct to compressor. The instrument panel on the right carries Stewart-Warner liquid level and temperature gauges.

South Wind
KINDLY HEATING



AND THERMAL
ANTI-ICING EQUIPMENT
HEAT GAS GENERATORS

Heater installation. Only the dispenser control of the burner is visible. The South Wind burner itself is in compartment 1 for completely inside the door, yet supplies up to 200,000 BTU's of heat in cold and arctic.

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► **Security Casualty**—An interesting sounding paper entitled "Automatic Track While Scan Radar," originally scheduled to be delivered at the National Electronics Conference (Sept. 29 to Oct. 1) in Chicago was dropped for undisclosed reasons.

► **F-4H Augmenter** Descendants—Part of structural damage to the F-4H tail reportedly has prompted USAF to permit augmenters to reduce the weight (goal of Northrop's new redesign study) by substituting segments. (WEEKLY WIRE

Sept. 5, p. 48) Result is that aug menters are less effective in changing and saving weight.

► **Storm in the Wind**—An indication of the growing prominence of Hughes Aircraft in the avionics field: Its engineers gave some technical papers from any other company at the recent IEEE Western Convention in Long Beach, Calif. Hughes engineers gave a total of 18 papers, Bell Labs was second with seven, Boeing Aviation third with four.

► **New GE Powerstat** For B-47—General Electric has developed high ac capacitor, low-loss electronic ballastometer which is slated for use in Boeing B-47s.

Device reportedly increases mass flow rather than viscous flow with less than 2% error. It can provide indication of instantaneous flow as well as laminar flow from the start of the flight.

► **Less Reports**—Bill Less reports he has noted up 115 in flight time on the newly automated autopilot cut off for the F-5 outgated "without any need except cut off."

► New Technical Bulletin

► A new list of dry power connections in the range of 7 to 18 contacts for use in unpowered avionics equipment is described in Dejar Avionics Corp. Bulletin D 716. (Industrial Sales Div., 1501 Northern Blvd., Long Island City, N. Y.)

► A new "D" series of miniature contact ranging from 15 to 18 contacts is described in Cansco Electric Co. Bulletin D 1. Connections are steel shell and arbor insulation. (Adv. Dept., P.O. Box 74, Lincoln Heights Sta. 31, Calif.)

► **Southern Industrial Electronics Co.** has prepared a complete catalogue describing its low-frequency transformers and reactors, including a new mini size line. SIE says its transformers and reactors have unusually high inductance giving excellent low frequency performance. (2351 Port Oak Road, Houston, Tex.) —FK

Crystal Diode Tester

The dynamic as well as static characteristics of crystal diodes can be tested using a new device developed by Compu Research Corp. (A small time interval is required for the device to remove its normal static resistance after each change in voltage polarity. When the period of the imposed frequency is shorter than diode recovery time, the diode will exhibit a higher resistance than under static or low frequency conditions.)

The CRD diode tester can handle diodes with forward currents up to 100 ma and back currents up to 1 ma. The device uses 144 v, 60-cycle power. (Compu Research Corp., 3545 W. El Segundo Blvd., Hawthorne, Calif.)

New Small Relay

A tiny high-brightness hermetically sealed relay designed to military Spec. AN E 19 is available from Advance Electric & Relay Co. The relay may be obtained with coil resistances up to 16,000 ohms with either silver contacts rated at 14 amp, or palladium contacts rated at 5 amp, in either SPDT or DPDT styles. Relay weighs 1.9 oz. Dimensions are .68x1.1x.3.

Advance Electric and Relay Co., 2495 N. Miami St., Burbank, Calif.



The direct-process prints and negatives produced from Kodograph are reproduced on Autopositive Paper when color copies are needed for the drafting room or shop. Delays and additional cost are made readily on Autopositive reproductions serving drafting room.

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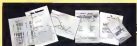
Here are some of the ways Sikorsky Aircraft, Div. of United Aircraft Corp., is using this photographic technique in material

There are no limitations now on the types of drawings, prints, or documents which can be reproduced in Sikorsky Aircraft's direct-process machine.

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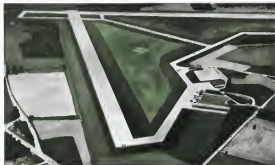
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Below: 10-engine
B-36



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Put down on either one of the two 4000 ft. paved runways. Receive complete Cities Service Aircraft Servicing... the finest in the world. Enjoy a leisurely ride into Bantex in comfortable Cities Service station wagons. Spend a restful and enjoyable evening in the Tide-water Inn, Easton's ultra-modern, thirty-five room hotel. Arrive refreshed the next morning and make your twenty minute hop into Washington.

Easton's 300-acre Municipal Airport is the perfect server for the busy flying executive who does business in Washington, D. C. Why not stop over next time you're near by?



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EQUIPMENT



TWA Likes Super Connie Handling Ease

- Visibility, vibration and control better in 1049.
- New model also has passenger refinements.

By George L. Chavira

Model 1049 Super Constellation recently put into service by Trans World Airlines retrograde several new ideas and refinements for the benefit of passengers and crew alike.

• Aircraft gets off the ground with considerable agility despite the 15,000 lb. increase in gross takeoff weight over the standard TWA Connie. In a flight with this heavier, plane took 10 sec. to be clear airborne from time full power was applied. Passenger load was near capacity, but fuel load was light.

• Vibration within the cabin appears to be less than in its smaller predecessor.

• Visibility from cockpit and cabin has been improved and seats are more luxuriant.

• Lounge gives passengers a place to move to, and berths are available for those who want to climb between decks for the transcontinental haul to which TWA has assigned the plane.

• Some Handicap-TWA's Captain H. W. Sherrard states that there is no appreciable difference in handling characteristics of the 1049 compared to the standard Connie since airborne. You just bring them in over the frons a little later.



BETTER GETTING OUT FAST, this chute and U brace swing against plane door.



BETTER VISIBILITY of new cockpit window vs. old (sketch) is shown here.

Lockheed engineers point out that rudder control has been improved considerably by enlarging rudders area approximately 25% over standard Constellation. And lengthening the fuselage

moves the empennage back, giving a 52 in. greater moment arm to the rudder. Longitudinal and lateral control means about the same.

Purpose of the improved rudder con-

Because of ATLASCOR's many years of electronic experience, landing order and aircraft manufacturers have come to us to design and manufacture in quantity, semi-quantified, even less, having us in single, newly installed and all the radio controls.

Meeting all applicable specifications, ATLANTIC custom-designed and volume-produced seals and other accessories virtually eliminate the risk of sealable engineering time and money breakdown problems. No doubt, we can help you, too.



STEWARD AIRPORT STEWARD, N.J.



Super Connec-
TWA Version

- [illegible]

cause of the masking effect of the engine's exhaust.

The new, seven-passenger lounge is popular, showing that we travelers do like to get up and move around.

Large, rectangular windows give excellent visibility. The foam rubber seats are comfortable—the reclining mechanism permits passengers to select an infinite number of reclining positions, not a few preselected stops. Every officer has at least one reclining seat.

Forward portion of the snout (also a considerable right beak, from upper and lower jaws).

Lengthened forward compartment seats 10, has a small lavatory and its own entrance door.

Lighter air conditioning system and improved air ducting are effective.

Stress-free control panel has been moved from the papyrus behind the left row of seats to the bulkhead behind the double jump seat provided for the girl. Panel contains controls for fuel, oil and lights, and water heater. Cover pulls down to form compact seating berth.

• **Quick Escape:** An effective method for postponing the evacuation chute is the rear cabin door is incorporated in TWA's 1946. The chute is stored in a tubular, collapsed frame which is lashed vertically to the fuselage just ahead of the rear door. Chute and frame are unrolled from out of sight.



Flying Carry-All for the Army Field Forces — Increasing numbers of Sikorski H-19's are coming off production lines in the traditional three-shaft cotton at the U. S. Army. They will be vital components of the Army's newly organized Helicopter Transport Companies which have the important assignment of giving logistic and tactical support for the ground forces.

In Army service, helicopters will be used for personnel and cargo transport, observation and reconnaissance.

were laying, disaster service, evacuation of the wounded and all the other duties for which they have proved so indispensable in Korea.

Adoption of the Sikorsky HH-19 by the Army has made its use synonymous with America's military services. Other modifications of this basic type helicopter have already been established as standard and important items of equipment with the Air Force, the Navy, the Marine Corps and the Coast Guard.

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ONE OF THE FOUR DIVISIONS OF UNITED AIRCRAFT CORPORATION

Less Wait!
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Reduce the Tare...Ship by Air!

And you'll save time and money in getting it there.

Shipments via Slisk Airfreight rep are less costly and packing... often none at all... than surface methods.

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THE GREY LINE...



WOULD BE THINNER STILL—

Between hostile forces and key air base sites in the United States stands a thin grey line of air defense jet interceptors... our primary defense against destruction.

This thin grey line would be thinner still were it not for the Lockheed F-94. Combining radar, missile, and pilot effectiveness with a superb design, it brought fast mass production in a vital field.

To meet the daily slip, to seek and destroy the enemy... in all weather... requires both performance and least electronic equipment and... equally important... freedom from air.

A W. Haydon precision turners help give the wings to F-94. A specially designed program turns them three phase current at pressure through the electrical heating elements in the leading edge of wing and tail.

The application of precision A W. Haydon turning equipment solves the problem of simultaneously achieving minimum heat distribution and peak heat concentration about a constant diameter at minimum weight.

A wide range of turning problems, including and critical aircraft are being solved with precision A W. Haydon turners, custom designed to your specific requirements.

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weathered flight and a once-around dinner on the eastbound leg. As a compromise between most domestic flights which serve no liquor and such airlines as Northwest and National, which serve just about anything a person would like to drink, TWA's Ambassador flights serve only one drink—champagne.

A new and improved policy should help attendance serve hot meals quickly. Bland trays, popular with most airlines, attract to seat accounts, so passengers need not balance meals on their trays.

TWA has ordered a fleet of ten Super Constellations.

Dump Valves to Boost Scorpion Climb Rate

Northrop Aircraft's F-99C Scorpion are being fitted with tip-tank dump valves. Rapid fuel release will permit a quick weight reduction for maximum rate of climb in short-range intercepts. F-99A and B planes also will get the dump valves in service modifications.

Typical on the F-99 are not efficient, but with dump valves short-term possible to a tank-dumping action will be obtained.

Major portion of the Scorpion's fuel is carried in wing and fuselage tanks. Service cooling is over 65,000 ft and the craft carries six 30-ton cannons. The plane is in operation with fighter-interceptor squadrons of the Air Defense Command's intercept, control and control forces.

Richfield Expansion To Up Avgas Output

Richfield Oil Corp. is planning a \$40-million expansion at its refinery near Long Beach, Calif., that will boost production capacity for aviation gasoline about three times.

The company's new plant include a new fluid catalytic cracking unit and will be a 16-story building, with larger capacity than any now on the West Coast.

Completion of the project in 1964 is expected to increase production capacity of aviation gasoline to more than 500,000 gallons a day, and enable processing capacity to more than 175,000 barrels a day.

Tiny Parts Grinder

Greater precision in grinding extremely small holes and grinding bearings and other tiny components in miniature aircraft equipment has become possible with development of

FULL BRAKES ON A WET RUNWAY

but no Skid

Westinghouse Decolstat® Controller stops skids before they start

Even on a slick, rain-soaked runway you can stick on full brakes—without skidding—if you have Westinghouse Decolstat® Controller. Every time a wheel slows down, the Decolstat® Controller immediately releases the brake—before the wheel stops completely and begins to skid. It supplies the brake instantly when the skid danger is over.

You can actually stop faster with Decolstat® Controller than if you locked the wheels and skidded to a stop, because the operation is tailored to the braking requirements of the particular plane on which it is used. The instant of ground loop or over-run are greatly diminished.

Decolstat® Controller gives you the precision bonus of safer landings... and saves you money too. A fire caused by too long and can be retarded more often because the better braking performance slows wheel. Decolstat® Controller more than pays for themselves in longer life.

For more information, write to Westinghouse Air Brake Company, Industrial Products Division, Wilmering, Pennsylvania.



AIRCRAFT SECTION

WESTINGHOUSE

AIR BRAKE COMPANY WILMERING, PA.

INDUSTRIAL PRODUCTS DIVISION





ENDURO MAKES

AIRCRAFT NACELLE *Stronger* YET *Lighter!*

The fast aluminum steel aircraft engine nacelles now are being built by Republic Enduro. This smooth-skinned barrel nose has wing sections of the Lockheed P-2V "Neposeum"—the U. S. Navy's new submersible aircraft carrier. When such 175-pound nacelle hangs a 3500-pound Wright Turbo-Opticon engine.

To take the shock of hang-down freedom of that heavy ship with its heavy engine, Lockheed designers turned to one new steel for increased structural strength without added weight. For maximum strength, Republic Aircraft Company, builders of the nacelles, used an extremely strong form of Enduro.

But, full ball nacelle steel is very light; gages posed several special production problems. Today's Republic report, "On several engine components of this test, Republic

worked closely with us all along the line. Their help and cooperation enabled us to transmit needed information and eventually lock the problem of obtaining full hard points to meet Enduro's high quality control demands. We are particularly grateful for Republic's cooperation."

Thus, the use of cold formed nacelle steel gave required strength together with an unusual inherent weight saving as compared with previous steel gages. What else have you for engineering Enduro's high physical and chemical properties to increase strength and to save weight? Republic's metallurgy specialists now do work with you on your aircraft application to realize the use of stainless steel. Contact them through your nearest Republic District Sales Office, or write:

REPUBLIC STEEL CORPORATION
Attn: Steel Division • Bluefield, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Dept. • Chicago, Ill., Box 71, N.M.C.



Republic
ENDURO STAINLESS STEEL

FULL-COLOR, 16 MM SOUND FILM—

37 MINUTES RUNNING TIME

Replaces lectures • Data selling • Available to modified group without charge. Republic 16 mm sound projects find some of engineering, type of production, completed data to Metal Processors Corp., 44 & 50, White Street, Chicago 1, Illinois, or write Republic Steel, Dept. C, Cleveland 1, Ohio.

Inc., El Segundo, Calif.

These shock test instruments, with a capacity of 750-lb force (10 to 2750), are made in conformance with JAN-5-44. Special springs can be applied to allow G impact loads. They test aircraft relays, instruments, switches, switches and other components in accordance with environmental test requirements of USAF 40465 B and MIL-E-5272. A typical unit is 50 in. high and weighs 300 lb.

Murtec, Inc., El Segundo, Calif.

Gunsight Heater

Range heaters are being produced by Valco Electric Co. for the Air Force to provide constant operational temperature control on guns in gunights.

Easy installation and concentrated heat are two advantageous features of the heaters which are electrically operated. They can serve both as spare and contact heaters and can be used for a mass loss of applications.

Two main types are a non-resistant steel sheath for temperatures up to 798°F and a stainless steel model for 1,200°F operation. Wattage runs from 75 to 840 for the former, 100 to 1,600 for the latter. There are six standard sizes, from 7 in. o. d. and 1/2 in. thick to 6 in. o. d. and 5/8 in. thick.

Valco Electric Co., Danvers, Mass.



Seat Locks Tested

To stop passenger complacency arising from failure of seat restraint mechanisms, locking devices are testing three new seat locks for use in Boeing Strato-liners, DC-7s, and Convair-Lorain (top to bottom, four photo). A fourth unit is being tested by Air Force to take 16G loads on all-facing seats. All models are mechanical Buss Locks, six simple parts, yet designed to provide smooth operation of hydraulic locks. Passenger won't be frustrated by jammed or trapping seats with their own seats which weigh less and are interchangeable with locks now in use, according to developers, Buss Aero Seat Co., Burbank, Calif.



Non-Treated Alloy Steel
Fit with PHEOLL
Aluminum Gages



**REGULAR, CLOSE TOLERANCE
AND INTERFERENCE FIT TYPES
MANUFACTURED FROM ALLOY
STEEL, STAINLESS STEEL AND
7050 ALUMINUM ALLOY**

Hi-Shear Rivets of all types—in a full range of sizes—are available through PHEOLL's exclusive manufacturing facilities . . .

- AA55 (11) 107 Coldworked Steel
- AA55 (16) Flat Rolling Steel
- AA55 (18) Close Tolerance 507 Coldworked Steel
- AA55 (20) Flat Steel
- AA55 (21) Round Steel
- AA55 (22) Close Tolerance 107 Coldworked Steel—7050 Aluminum Alloy
- AA55 (24) Flat Rolling Steel—5052 Aluminum Alloy
- AA55 (25) Close Tolerance 507 Coldworked Steel—Aluminum Steel
- AA55 (26) Flat Rolling Steel—Close Tolerance Steel
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- AA55 (97) Close Tolerance 507 Coldworked Steel—Aluminum Steel
- AA55 (98) Flat Rolling Steel—Close Tolerance Steel
- AA55 (99) Close Tolerance 507 Coldworked Steel—Aluminum Steel
- AA55 (100) Flat Rolling Steel—Close Tolerance Steel

Other Types of Hi-Shear Rivets made to customer specifications. Standard Catalog for all sizes of Hi-Shear Rivets. Air Force Order for standard catalog.

The Hi-Shear Rivet consists of a hardened pin and a replaceable aluminum collar. Driving may be done from either end. A simple one-piece cover is fitted to the conventional rivet gun (or it can be used as part of the backing bar), and a pneumatic driver may be employed. As the collar is forced into the grooves at the end of the pin, a ring of waste material is pushed off and automatically ejected, leaving a smooth low crowned head. SEE CATALOG and Engineering Data Sheets. Available on Request.

Five Reducing Features and Advantages

- 1. Adaptable to high speed working of rivets, longer than steel rivets with full heads.
- 2. Does not require special tools. No special tools are required to prepare the rivet. The collar is driven into the grooves of the pin.
- 3. No special aligning or spreading gun. The rivet is driven into the grooves of the pin.
- 4. The rivet is driven into the grooves of the pin.
- 5. The rivet is driven into the grooves of the pin.





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Test equipment

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WESTON

Aircraft Instruments

WESTON ELECTRICAL INSTRUMENT CORPORATION
617 Hollingsbury Avenue, Newark 5, N. J.

Ryan Ceramics Gage

An instrument that is claimed to measure the thickness of ceramic coatings on flat or curved engine parts with baseline accuracy, has been produced by Ryan Aeronautical Co. It was conceived originally by National Bureau of Standards.

The gage is expected to permit more accurate analysis of the effect of heat on ceramics and better quality control of production coatings. It is accurate to within .0005 in.

The instrument is being used by Ryan members to analyze coatings on company-made parts that are in actual airline service. They feel they have "a real field to lose" with more than 2,000 hr accumulated already on Pratt & Whitney R-4360 engine blades on Boeing Strikemasters. These are coated with Ryan ceramics.

Ryan Aeronautical Co., Lindbergh Field, San Diego, Calif.



Marker Beacon Unit

Low, low, but widened its base of radio equipment with the introduction of a new 75-mc. marker beacon receiving unit.

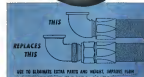
Called the Model 1290, it is designed to fill the needs not only of light aircraft, but of heavy, multi-engine aircraft operation as well. It carries CAA Radio Type Certificate GR161. Both visual and aural output can be utilized. An exclusive feature, says Lear, is that the receiver can operate a loudspeaker directly. Three lights, adjustable for intensity, one each for outer, middle and inner marker beacon signals, are installed on a small unit that mounts directly to the instrument panel. This is the de luxe model.

A simpler, lower-priced receiver is available with aural output only. Both models have a simplified, single-clamp shock mount, can be operated on 15- or 24-v. systems. Sensitivity is adjustable from 500 to 10,000 microvolts for beam detection. Selectivity is 2.75 db at 60 db and audio output power 200 mW at 500 mW and output impedance 500 ohms and 3:1 ohms.

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FINANCIAL

Good Risks

- Report indicates aviation insurance profitable.
- \$109 million in premiums paid in five years

Coverage of aviation risks has proved quite profitable to insurance companies writing this type of protection. That is one of the major indications in a new report released by the Insurance Department of the State of New York. Under review was the Aviation Insurance Rating Bureau, licensed under the New York State insurance law. It is also licensed as a rating bureau in California, Montana, New Jersey, and North Carolina. Aviation insurance in other states is excluded generally from the rating law.

• **Insurance Organization.** Membership of this rating bureau consists of 61 separate insurance companies represented by the Associated Aviation Underwriters. This group writes insurance for about eight of the ten airlines, representing the greatest segment of the industry.

The Aviation Insurance Rating Bureau provides rates for aircraft hulls, aircraft passengers liability, aircraft bodily injury liability, aircraft property damage liability and employees' aviation indemnity. The Bureau is a voluntary non-profit organization and term, serving other things, too.

Establish and administer plans to complete... complete, accurate and up-to-date statistical data for use... in the establishment of underwriting rules, classification of risks, rating plans, rates or premiums and collect and analyze experience.

Aviation insurance premiums are big business and range anywhere from \$40,000 to \$1 million per year for individual airlines. A measure of competitiveness is afforded in that there are four principal markets or groups.

Associated Aviation Underwriters, U.S. Aviation Insurance Group, Aerm Associates, and Lloyd's of London.

The table on page 57 shows the volume of insurance premiums written as well as loss experience of Associated Aviation Underwriters members in the principal categories for the five years ended December 31, 1958. During that period more than \$109 million in in-

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Policies Year	Net Direct Premiums Earned	Insured Losses Including Allocated Claims Expense	Loss Ratio %
Full Ground Coverage			
1952	\$6,828,118	\$4,583,217	65.84
1953	7,714,861	5,147,815	66.69
1954	8,660,662	5,799,740	66.85
1955	9,111,265	6,000,200	65.97
1956	9,511,248	6,200,200	65.11
Total	\$59,826,054	\$42,736,367	71.43
Full Crash Coverage			
1952	\$9,457,964	\$7,220,800	76.35
1953	9,559,614	7,352,319	76.91
1954	9,588,168	7,389,740	77.05
1955	9,624,207	7,424,136	77.15
1956	9,720,329	7,463,100	76.77
Total	\$58,150,262	\$42,849,994	73.51
Aircraft Passenger Liability			
1952	\$4,728,221	\$4,520,100	95.61
1953	4,729,114	4,512,100	95.41
1954	4,760,114	4,512,100	94.79
1955	4,760,114	4,512,100	94.79
1956	4,760,114	4,512,100	94.79
Total	\$23,637,676	\$22,570,500	95.47
General Public Liability			
1952	\$84,544	\$10,120	12.01
1953	1,250,214	121,000	9.68
1954	1,110,214	121,000	10.90
1955	1,110,214	121,000	10.90
1956	1,110,214	121,000	10.90
Total	\$4,408,404	\$4,000,000	90.52
North Property Damage Liability			
1952	\$611,522	\$471,170	77.05
1953	611,522	471,170	77.05
1954	611,522	471,170	77.05
1955	611,522	471,170	77.05
1956	611,522	471,170	77.05
Total	\$3,057,770	\$2,350,000	76.88
Percent Accident (Qualifying & Group)			
1952	\$1,000,000	\$910,000	91.00
1953	1,000,000	910,000	91.00
1954	1,000,000	910,000	91.00
1955	1,000,000	910,000	91.00
1956	1,000,000	910,000	91.00
Total	\$5,000,000	\$4,550,000	91.00

* Estimated Casualty Premiums

\$50,000 Insurance Department Rate of New York, 1952.

average premiums were paid by about eight to ten airlines for the indicated protection.

Loss Premium Ratios—In the largest category, full crash coverage, the average loss ratio for the five years amounted to 65.9%. Incomplete premium ratios covered incurred losses in the last several years of 1946 and 1947. Significantly, this loss ratio declined sharply during the last three years for the three other categories, full ground

coverage, full crash coverage, and air crash passenger liability. For 1956, for example, the loss ratio on full ground coverage was only 65.1%.

In only one instance during the five year period have losses exceeded outstanding premiums in any category and then that by a small degree. This is a record property damage liability for 1949.

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THREE GRANT WING AIRCRAFT for Boeing's B-47 Stratojet—the largest ever jet into production—are an example of Ryan leadership. Each of these huge tanks, comparable in size to the fuselage of the Navaho, requires over 30,000 electronic spot welds and other advanced production techniques developed by Ryan.

RYAN L-59 MUSTANG LIAISON NAVAHOS have very extensive combat service in Korea. They have received high praise for their excellent flying characteristics, efficiency in operating from short, rough fields, and great safety in high terrain operations and aerial maneuvers.



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AIR TRANSPORT

Big Future Forecast for Intercity Copters

- Pineski predicts use of large transports by '57.
- But better heliports and navigation aids needed.

The helicopter can start replacing fixed-wing Cessna and Martin in routes up to 150 mi. distance by 1957. That is the primary mission of a Pineski Helicopter Corp. paper presented to the SAE by board chairman F. N. Pineski and special projects engineer L. S. Welford.

But how soon before 1960 the big multi-engine copter actually invades metropolitan and outlying air routes depends on how fast necessary terrain, and heliport facilities and techniques are prepared, the paper states.

Field and Sikorsky sites are packing plans for large commercial copters. These are highlights of the Pineski analysis.

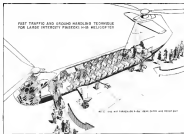
Intercity travel time from downtown to downtown by a 125-mpg copter will compete with fixed-wing craft up to 200 mi. distance. The 178-mpg copter coming next will beat the fixed-wing plane up to 315 mi. "Further development... in a cruising speed of 200 mph. could extend the helicopter's speed advantage up to the 500 and 600-mi. stage distance."

On a 200-mi. intercity distance, the 175-mpg copter takes 1 hr., 55 min.; that is 25 min. faster than conventional, less time and so time for a trip in a plane that cruises at 250 mph, it is claimed. As speed and economy mount, the copter will easily out-pace the conventional scheduled airline market but will divert once time of travel, bus and auto, the paper says.

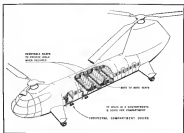
Costs—Cessna's cost on conventional copters of 40 seats or more will be from 6 to 8 cents per passenger-mile, Pineski says. This is competitive with present fixed-wing air travel on short hauls, which is averaged at 6.8 cents per passenger-mile before insurance charges of 52¢ applied at each end, which on a 100-mi. trip makes fixed-wing travel cost 8.6 cents. Hence, Pineski believes, copters will be as cheap as the plane, and faster.

Here are some company assumptions by Pineski:

- Initial cost slightly higher, yet per-passenger, because of the substantial maintenance and other systems, but



GROUND HANDLING TECHNIQUE: runway turn shows two-axle seating, whole



BRIDGEMONT ARRANGEMENT: seats in forward, the Emperor without on

empler structure, landing gear and equipment systems should almost self-test.

- Utilization should be higher because of shorter time on ground, and its greater speed, because the short haul market, should also lengthen the air travel day—reduce passengers to use it earlier and later in the day.

• Depreciation time should be short equal.

- Insurance should be higher at first, but "eventually" be lower because the copter "will be found inherently safer than the airplane."

• Maintenance of copters on regular schedules now requires lighter preparation of umbrellas and replacement

parts, but "with provision for rapid replacement now incorporated in current production helicopters, and with lower replacement systems in helicopters, the overall maintenance manhours per air hour should be much less than that of airplanes."

- **Heavily productivity above 100 mi distance** is less than the airplane because of the slower cruise-velocity speed.
- **Torque shaft** should be considerably less.
- **The airplane pays a high price** in traffic due to the displacement of down town center and airports.
- **Landing fees** will be less at heliports than at airports, but airports are usually simpler and changes should be correspondingly less.

Then, says Paszold, copies' direct costs per ton-mile will be higher, but indirect costs "can certainly be lower."

- **Other Advantages**—Copter advantages as short landings include:
 - **Speedier than any other form of transport**, including the train.
 - **Safer than planes and autos**. Simple construction, slow approach and improving aerodynamic reliability will make this so, Paszold contends.
 - **More regular than planes**. Regularity and punctuality are based on far better than airplane timetables are in terms of being hit by low weather ceilings. Lack of punctuality has been a major deterrent to short-haul air travel.
 - **Convenience of package service** will be "greater than of the railroad, faster than of the airplane, and also simpler and more economical of operation than both."
 - **Public acceptance** is critical, but Paszold insists that "the public feels the helicopter to be safer than the airplane."
 - **Copter Problems**—Below the copper coin note is on the longer leg to 150 ft and notes this decade, the airlines, manufacturers and FAA want answers to some current riddles. Also unresolved problems include all weather navigation facilities, takeoff engine failure safety criteria and consequent heliport design requirements. Other problems include arrangement of transport center parking, baggage, entry and takeoff.
 - **Navigation**—Air Navigation Development Board is planning an experimental program to develop copter facilities, and ideal flight equipment and techniques. Copter altitudes installed so far do not have "hot wire" characteristics. The present high-frequencies navigation sets are not always effective below 10,000 feet and below.
 - **Engine failure**—CAA has proposed that copters be able to climb at a rate of 1 ft divide in 20 ft forward travel with max output. But it would need 200-400 hp per foot descending on speed. This hurts payload capacity and requires modified heliport takeoff runs.

Bonanza Strikes Gold on Coast

Comparative newcomer is real threat to big airlines; its flight with WAI may alter CAB policy on feeders.

By William J. Conthine

Las Vegas, Nev.—Western Air Lines' long dominance of the lush Pacific Coast market trade has been challenged by the comparative newcomer in commercial aviation, fledgling Bonanza Air Lines.

The fight between Western and Bonanza has touched off tale again involving United, TWA, American and Southwest, has brought Civil Aeronautics Board prices for regional and feeder lines into question, and has been the source of a legal battle reaching U. S. Supreme Court, whose decision in the case will affect all U. S. airlines.

• **Drop Route Issues**—Incumbent spark in the lead was a CAB decision last January ordering Western to suspend service to El Centro, Calif., and Yuma, Ariz., and awarding a certificate for a Phoenix-San Diego-Las Vegas feeder route to Bonanza. But how does the case go much deeper than this help-coastal decision.

• **Will Bonanza and Southwest** help change to put a strong regional competitor into the field against Western? • **What will the Supreme Court** decide on Western's plea that the CAB action in the Imperial Valley case was not supported but revocation of a permanent certificate and that CAB has no authority to revoke the certificate without just cause? Supreme Court also must determine whether property rights result from a permanent certificate and whether the Board's action in suspending Western amounts to seizure of property without compensation, a violation of the Fifth Amendment.

• **Has CAB adequately** defined the parameters of feeder, regional and transcontinental lines? • **Stakes in the battle** are seen clearly in this gambling capital of the West. Home at Bonanza Air Lines. Every line in the coast, directly or indirectly, back to McClean Field and the big neo-empire hotel houses which is headquarters for the Route of the Gold Strike. The situation calls for a detailed study of the little airline with four DC-3s crisscrossing between Western line air straddled out as its own.

• **How Bonanza Strife**—The start of Bonanza was unimpressive. Edward G. Converse returned from World War II with a nose full of line travel in Navy intelligence and amphibious landing operations and a desire to start on his own. Unlike many veterans, Converse had money. He tossed up in Las

Vegas with Charles Keene and June Simon, who had no experience.

With Keene and Simon's franchise money, Converse and \$50,000 of Converse's money, Bonanza Airways began operating a charter service between Las Vegas and Reno. The company and leased a War Assets C-47 and started one roundtrip a week between the two Nevada cities.

Walter Warren of Reno bought one Simon and Keene in 1946 and Florence Murphy also joined the group. The name was changed to Bonanza Air Lines.

More flights were added and in 1947 Bonanza decided to apply for a certificate. Wesley J. Danahy, owner of a Los Angeles construction firm, joined the line in 1947 and convinced the CAB he matched the \$50,000 which Converse had invested by this time. To return the owners had little to show but a guest dual all experience in operating small Nevada's domestic routes and a great amount of red ink on the books.

• **Bonanza Loses—CAB** awarded Bonanza a certificate in June 1949 for a Reno-Las Vegas-Phoenix route, an out-of-date Western line TWA Route 35 between Las Vegas and Phoenix and made an additional showing of financial fitness before starting operation. Bonanza bought the route for \$100,000 and in November 1949 a three year certificate was issued. The certificate expires at the end of this year.

From the time of its operation in 1949 until November 1949, Bonanza had lost roughly \$120,000. The airline still is operating in the red. Converse has poured some \$150,000 into it, Danahy \$270,000.

After receiving a permanent certificate, Bonanza purchased four DC-3s, two from United, one from Western and one from TWA. With these, the company set out to drum up trade along the barren stretch of desert between the Las Vegas-Phoenix line to be the least profitable segment. TWA had been operating one flight daily with a load factor approximating 10%.

Bonanza soon was operating two flights daily with a 60% load factor.

Here lies one of the keys to Bonanza's success and to its popular acceptance in the area over which it operated before being awarded the Phoenix-San Diego-Las Vegas line service route.

• **Clips Feed-For** came years that was all-seeing between Reno and Las Vegas, competing for gambling, amusements, divorce and tourist trade lines



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EDITORIAL

The Public Must Be Served

Civil Aeronautics Board is holding another omnibus investigation of the possibilities of low fare air transportation. It will run on for months, perhaps a year or more.

We hope all the facts come out. We think many have been grossly appraised for several years, but the Board and some of the certificated camera people not to war there.

For example, one of the questions being asked by the inspectors happens to be: Is there a need for air transportation services by the home countries concerned?

There would seem to be a ready-made answer to this one by looking at the periodic statistics CAB obtains from the irregular carriers themselves. The record has been well published for several years. However, the Board is using non-scheduled carrier traffic figures in its current inquiry that are already more than a year old—on to Sept. 31, 1951.

According to latest figures on file with the Board these large regular earners in the first half of 1952 took in revenues of \$72,332,000. This was an increase of 28% more the \$25,151,000 reported for the first six months of 1951.

The same carrier flew 98,068,000 revenue passenger miles in the first half of this year, for an increase of 59% over the 790,184,000 revenue passenger miles flown in the comparable period of 1951.

How about the latest 12-month period? In the fiscal year ended June 30, 1992, the regular carriers report revenues of \$66,841,000, a gain of 38% over the \$48,523,000 taken in during the previous fiscal year. Revenue passenger miles in the latest recorded 12 months exceeded a billion! The exact figure was 1,290,634,000, or a 49% increase over 870,451,000.

Despite a strenuous publicity campaign waged against these carriers, they have been able to keep building an impressive business from scratch.

That record seems to answer the Board's question rather convincingly—is there a need for air transportation service by the large area?

Furthermore, the seed appears to be growing the longer that CAB "studies" the matter, and the longer the major articulated transcontinentals fail to win over or put a dent in the southerly traffic.

It should be noted that certificated airline passenger business too has been increasing during the irregulars' big revenue gains and this is true for both scheduled coach and full-fare service. The old charge that the irregulars divert business from the scheduled is much more difficult to prove than the irregulars' contention that they are creating new business for all air carriers.

It also seems difficult to prove the certified owners' claim that they are now meeting adequately the public's need for responsive air transportation. A billion prison germs sold by competitors in a post is impressive evidence for the contrary.

So is the recent information that one scheduled carrier keeps long waiting four weeks for its transcontinental air-

coach fights. This is several times slower than a coast-to-coast train ride!

One important point should be made, we think. This is not really a matter of "steals" versus "assaults" at all. It is primarily a matter of encouraging and meeting the public's demand for air transportation. Any argument of victim-salutism it is—that does less than its best on this score is negligent and inappropriate. And any criticism going that far will sell a billion passengers under a very short time. The public must be served; it will be served.

Appalling Blunder

There is no more security-minded group in our Air Force than the Strategic Air Command. Extreme measures are taken at its bases to preserve security. There is some Air Force opinion that SAC exceeds it a bit.

The average American, however, is not likely to complain, even on those infrequent occasions when he encounters these inept street regulations. He feels it's all meant for his protection.

But many drivers were skinned and many of us were injured the other day at the result of a tornado that ripped through Carswell Air Force Base at Fort Worth and the Conquer almost over a short distance away.

The crash, rip-up of most of the bombers, announced by the Air Force hardly affects the public's dream that so many of our biggest bombers were allowed to be constructed in one area.

It was an appalling error, corrected in seconds, needed SAC failed in where agents exerted most

—Robert H. Wood

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Source: *Schools: National Educational Statistics*. 28 Feb. Apr. New York: N. Y.**LEADER IN**

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